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Washington, D.C.

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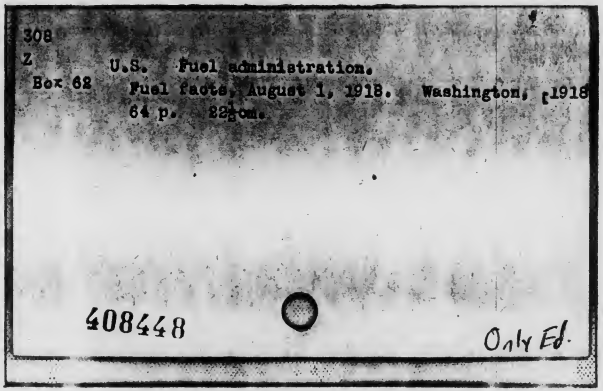

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FUEL FACTS

AUGUST 1, 1918

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United States
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WASHINGTON, D. C.

Fuel Facts

AUGUST 1, 1918

Published by
**United States
Fuel Administration**
WASHINGTON, D. C.

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TONNAGE RECORDS UP TO JUNE 30, 1918, AND WHAT THEY INDICATE

In 1917 we produced 64 million net tons more coal of all kinds than in 1916. Average increase 16 million tons each three months.

For the coal year of 1918-1919 we need 80 million more tons than the marvelous production of 1917. Average increase needed 20 million tons each three months, over last year.

In the first three months of 1918 we produced about 1,400,000 tons less than in the same period of 1917. (Chief reason, bad weather.)

In the second three months of 1918 we produced 11,670,000 more tons than in the same period of 1917, i.e., April, May and June.

Net problem facing us:

We must produce between July 1, 1918, and April 1, 1919, twenty-two and a half million tons more in each three months than the average of 1917, or, just so much as we fall short, just so much must we save from ordinary uses, or the war machine will suffer.

Fewer miners are obtainable than last year, but those left at the mines are WORKING AS NEVER BEFORE. Everything that can be done to increase production and facilitate distribution is being done. Everyone, to keep the country safe and prosperous, must begin SAVING AS NEVER BEFORE.

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INDEX

Subject *Page*

Administrators, State Fuel........ 62
Agreements as to wages.......... 18
Air circulation important with furnaces 34
Air easier to heat if moist.....32 to 36
Allotments, anthracite, for 1918-19 12, 13
Ammonia, saving in use of........ 46
Analysis of coal production....... 54
Anthracite allotments for 1918-19 . 12, 13
Anthracite Committee 61
Anthracite for Canada cut down... 24
Anthracite not for factories....... 53
Anthracite production records..... 54
Anthracite region in United States. 52
Anthracite shipments of 1917 and 1918 12
Apportionment of anthracite....12, 13
Australia, total coal reserves...... 53
Austria and Hungary, coal reserves 53
Austria-Hungary, coal produced in. 64
Authority of Fuel Administration.. 9
Automobiles, pleasure, curtailment of fuel for..................... 28

Beehive coke 30, 31
Beehive coke, coal used for, 1917.10, 11
Belgium, coal produced in......... 64
Belgium, total coal reserves....... 53
Beer making restricted............ 26
Best coal for bunkering ships..... 23
Bituminous coal used in 1917....10, 11
Bituminous exports, 1917.......10, 11
Bituminous production increase.... 54
Bituminous production, 1917....10, 11
Bituminous regions in United States 52
Bituminous requirements 10, 11
Bituminous zone system........... 19
Bottles, manufacture of restricted.. 29
Breckenridge, L. P., on heat control 32
Brick, manufacture of, restricted.. 27
Bunker coal, higher prices for..... 24
Bunker coal, regulation of......... 23
Bunker coal used in 1917........10, 11
Buy coal early, inducement to..... 17
By-product coke 30, 31

Campaign for use of wood......48, 49
Canada, coal produced in.......... 64
Canada shipments restricted....... 24
Canada, total coal reserves........ 53

Subject *Page*

Check draft-damper, its importance. 33
Chimney gets most of your heat.... 32
China, total coal reserves......... 53
Classification of consumers........ 49
Classifications of coal............. 64
Clay products, manufacture of, curtailed 27
Clean coal order.................. 19
Cleaning of heating surfaces...32 to 35
Clearing woodlands to save coal.48, 49
Clubs, country, restriction of fuel to 29
Clocks moved forward to save coal. 38
Coal and coke shipments, priority.50, 51
Coal production, analysis of....... 54
Coal reserves of the world......... 53
Coal saved by daylight law........ 38
Coke and coal shipments, priority.50,51
Coke, beehive, coal used for 1917.10, 11
Coke for export, prices for........ 24
Coke, production of............30, 31
Coke Representatives 61
Coke, yield of, from coal.......... 52
Commission, Federal Trade, report of 9
Comparisons of coal production.... 54
Congestion of war industries...... 21
Conservation in power-plants...... 42
Conservation necessary 8, 10, 11
Conservation of coal abroad........ 22
Conserving light and power.....42, 43
Consumption, bituminous, 1917..10, 11
Control of domestic consumption... 15
Control of fuel in Europe......... 22
Control of heat by dampers....32 to 35
Cooler houses healthful........... 36
Creation of Fuel Administration... 9
Crude oil movement in May, 1918.. 57
Crude oil produced in East, 1917... 56
Curtailment avoided 42
Curtailment in use of anthracite.12, 13
Curtailment of non-war industries.. 26
Curtailment order of Jan. 17, 1918 38, 39

Damper control ....32 to 35
Daylight saving, here and abroad.. 38
Decades, coal production by....... 54
Deposits of coal in United States.. 47
Development of hydro-electric power 40
Distribution of anthracite.......12, 13
Distribution of coal in 1912....... 41

Subject *Page*

Distribution within States......... 49
District Representatives 63
Domestic consumption under control. 15
Draft control, importance of....... 32
Dry air, harder to heat than moist 32 to 36
Dryness of air, how to avoid...... 36
Duplication of power systems...... 46
Duplicate transmission systems..45, 46

Early buying urged.............. 17
Early ordering campaign, effect of 10, 11
East to get West Virginia coal.... 20
Efficient power plants, use of...... 46
Electric railways, power used by... 41
Electricity as a motive power...... 40
Electricity, saving of..42, 43, 44, 45, 46
Elimination of uneconomical plants 44
Employes of mines in each State... 51
Enamelled ware, curtailment of restricted 28
England, control of coal in........ 22
Establishment of Fuel Administration 9
Europe, control of coal in......... 22
Europe's use of wood as fuel....48, 49
European countries, production of.. 64
Executives of Fuel Administration 58 to 61
Export coal and coke, prices for... 24
Exports of oil refineries........... 57
Exportation of coal restricted..... 24

Factories not to use anthracite..... 53
Factories, rearrangement in.....43, 44
Federal State Administrators...... 62
Federal Trade Commission report.. 9
Fewer miners now working........ 16
Fires, household, how to control.32 to 35
Fixing of mine prices............ 25
Florists agree to curtailment...... 28
France, coal conditions in......... 22
France, coal produced in.......... 64
France, total coal reserves........ 53
Fuel Administration, creation of... 9
Fuel Administration executives 58 to 61
Fuel Administrators for States.... 62
Fuel needs of war machine......10, 11
Fuel values of various woods....48, 49
Furnace heaters, how to run....... 34

Garfield, Harry A., biography...... 58
Gas and oil-power development.... 41
Gas distilled from coal............ 52
Gas, natural, U. S. production..... 56

Subject *Page*

Gas, yield of, from coal and lignite. 52
Gases, coal, how to consume them.. 33
Germany, coal produced in........ 64
Germany, control of coal in....... 23
Germany, total coal reserves....... 53
Grates, care in shaking........... 33
Grades of coal defined............ 64
Great Britain, control of coal in... 22
Great Britain, coal produced in.... 64
Great Britain, coal reserves....... 53
Greenhouses, fuel for, curtailed.... 28

Heat goes up the chimney......... 32
"Heatless days" order..........38, 39
Hickory as a coal substitute.....48, 49
Hot-water heaters, how to run..... 35
Household heaters, how to run..32 to 35
How to use wood as a fuel......48, 49
Humidity, effect of, on heat....... 36
Hydro-electric power development.. 40

Ice conservation methods.......... 46
Ice, fuel saved in making of....... 29
Importance of oil production...... 55
Imports of soft coal............10, 11
India, total coal reserves 53
Inducement to buy coal early...... 17
Industries, coal and power used by.. 41
Industries, priorities of.........50, 51
Industries, soft coal used by, 1917.10, 11
Industries, war, congestion of..... 21
Inspection of all power-plants..... 42
Interconnection of power systems.45, 46
Intrastate coal distribution........ 49
Isolated electric plants............ 44

Japan, coal produced in.......... 64
Jobbers, licenses for.............. 37

Kitchen ranges, how to run....... 35

Labor Bureau of Fuel Administration, creation of............... 18
Lake-dock prices reduced.......... 54
Larson, G. L., on heat loss......... 32
Licenses for coal jobbers.......... 37
Light and power saving.........42, 43
Light and power saving in factories 43, 44
Lightless nights orders............ 30
Lignite, products yielded from..... 52
Locomotives, oil used by.......... 55

Manufactures, power used by...... 41
Manufactures, preferred 50, 51
Manufacturing of non-war products curtailed 26

Subject *Page*

Margin, maximum, allowed to retailers 25
Maximum production, minimum waste 42
Men wanted in coal mines......... 16
Miners, exempt from war in Great Britain 22
Miners, fewer now working........ 16
Miners, number in Great Britain... 22
Mine employes, number in each State 51
Mines, new, opening of........... 17
Mines, soft coal used by, 1917...10, 11
Minimum waste, maximum production 42
Mining efficiency stimulated....... 14
Mississippi, oil produced east of... 56
Moist air, easier to heat than dry 32 to 36
Moist air foe of pneumonia........ 36
Moist air in rooms, advantages of.. 36
Mondays, "heatless" 38, 39
Musical instruments curtailed..... 29
Natural gas, value of, produced in United States 56
Needs, bituminous, 1918-19......10, 11
New mines, opening of........... 17
Northwest coal prices reduced..... 54

Officials of Fuel Administration 58 to 61
Oil and gas-power development.... 41
Oil, coal to replace.............10, 11
Oil problem, one of transportation. 8
Oil produced in East, 1917........ 56
Oil production, increase of........ 55
Oil refinery exports.............. 57
Oil refinery production and outgo.. 57
Oil statistics for May, 1918....... 57
Oil used by locomotives........... 55
Opening of new mines............ 17
Order to insure cleaning of coal.... 19
Overheated air unhealthful........ 36

Penalties enforce wage agreement.. 18
Penalties in Great Britain........ 22
Periods, coal production by....... 54
Personnel of Fuel Administration 58 to 61
Petroleum movement in May, 1918. 57
Petroleum production in 1917..... 56
Physicians advocate cooler homes.. 36
Plants, power, inspection of....... 42
Pneumonia caused by heat........ 36
Population congested in anthracite consuming States 21
Power and light saving.........42, 43

Subject *Page*

Power and light saving in factories 43, 44
Power, hydro-electric, development. 40
Power of Fuel Administration..... 9
Power-plant, inspection of......... 42
Power saved by skip-stop plan..... 45
Power systems, interconnection of.45, 46
Power systems, duplication of..... 46
Power used in the United States... 41
Preference lists, how compiled..... 49
Preferred industries 50, 51
President's coal shovel tagged..... 39
Price of coal reduced............. 17
Price panic prevented............ 25
Prices, at mine, how fixed......... 25
Prices for export and bunker coal.. 24
Prices from lake docks............ 54
Prices, maximum, retail, how fixed. 25
Primary power development....... 41
Priority of coal use in Great Britain 22
Priorities of coal and coke shipments 50, 51
Priorities of industries.........50, 51
Problem, fuel, importance of...... 7
Production Bureau organized...... 14
Production, coal, analysis of....... 54
Production, coal, in the world..... 64
Production, coal in United States, 1915 and 1916................ 51
Production of coal in 1912........ 41
Production of oil, increase of...... 55
Production, oil, 1917 figures....... 56
Production of soft coal, 1917....10, 11
Products of oil refineries.......... 57
Products derived from coal........ 52
Profits, maximum, of retailers, fixed 25
Proper damper control........32 to 35
Public utilities, coal used by, 1917 10, 11
Public utilities, power used by..... 41

Rail haul saved by zone system.... 19
Railroads, coal used by, 1917....10, 11
Railroads, fuel oil used by......... 55
Railroad priority 50, 51
Rank of States in coal production.. 51
Ranges, kitchen, how to run....... 35
Rations of coal in Germany....... 22
Rations of coal in Great Britain... 22
Rating of power-plants............ 42
Reduction in lake-dock prices...... 54
Refinery, oil, production and outgo. 57
Refrigerating plants, saving in.... 46
Report on coal situation, 1917..... 9
Report of Federal Trade Commission 9

Subject *Page*
Representatives, District 63
Reserves, coal, of the world....... 53
Reserve supply of coal needed...10, 11
Resources, coal, of the United States 47
Restriction of manufacturers...... 26
Restriction order of Jan. 17, 1918 38, 39
Retail prices, maximum, how fixed.. 25
Rules, general, on running heaters 33, 34
Russia and Siberia, coal reserves... 53
Russia, coal produced in.......... 64

Sanitary ware, manufacture of, restricted 27
Saving by skip-stop system........ 45
Saving coal in households......32 to 35
Saving coal in power-plants....... 42
Saving daylight, here and abroad.. 38
Saving in isolated electric plants... 44
Saving of coal by daylight law.... 38
Saving of light and power......42, 43
Saving power and light in factories 43, 44
Shipments of anthracite.......... 12
Shipments to Canada restricted.... 24
Ships, best coal for bunkering of.. 23
Ships bunkered on "heatless days" 38, 39
Shortage of coal, 1918-19.......10, 11
Shortage of miners feared........ 16
Skip-stop system effective......... 45
Soft coal needed, 1918-19.......10, 11
Sources of coal in United States... 52
South Africa, coal reserves........ 53
Staff of Fuel Administration.. 58 to 61
State Fuel Administrators........ 62
States, rank of, in coal production. 51
Steam, coal used in making........ 41
Steam-heaters, how to run......34, 35
Steam-power development 41
Storm windows, advisability of.... 33
Stimulation of production......... 14
Strikes settled by wage agreement. 18
Summer buying, need of.......... 17

Subject *Page*
Supply of coal remaining in United States 47
"Tag day" ceremonies............ 39
Temperature needed in homes..... 34
Terra Cotta manufacture curtailed. 27
Tile, manufacture of, restricted.... 27
Trade Commission, Federal report of 9
Transportation for new mines..... 17
Transportation saved by zone system 19

United States, coal reserves....... 53
Use of available water power....45, 46
Utilization of coal in United States 52

Value of coal products............ 52
Value of various woods as fuel..48, 49

Wage agreement settled strikes.... 18
War conservation of power and light 42, 43
War industry congests Northeast... 21
War needs aided by "heatless days" 38, 39
War plants, coal stocks for........ 49
War requirements of coal.......10, 11
War work to spread West and South 21
Washington wage agreement...... 18
Waste saved without curtailment... 42
Water in air needed with furnaces. 34
Water-power as a coal saver...... 40
Water-power, by groups of states.. 40
Water-power development 40, 41
Water power, utilization of.....45, 46
Weather-strips, advisability of..... 33
West Virginia coal for the East... 20
Wholesale prices, how fixed........ 25
Window glass, manufacture of, curtailed 29
Wood as a coal substitute.......48, 49
Wood as a fuel and how to use it.48, 49
Wood used with coal as fuel.....48, 49
World's coal production, by years.. 64
World's total coal reserves........ 53

Yachts, fuel for, cut off.......... 28

Zone system, bituminous.......... 19

THE SAVING OF COAL IS A NECESSITY, NOT OF THE FUTURE BUT OF THE PRESENT DAY. BEGIN NOW. UNCLE SAM BIDS YOU DO IT.

Our Fuel Problem

The solution of the world's war problem must depend upon the solution of America's fuel problem. Fuel, the driving force of the war, must be available in quantities sufficient to insure victory. Without fuel the vast and intricate machinery of war industry must stop; railroad and steamship traffic will be clogged, and the steady progress of our armies will be halted. All of the great war machinery depends on fuel.

Now, in midsummer of the nation's second war year, it is certain that the nation's enormous demands for fuel cannot be fully met. Although seven hundred thousand miners work to the limit, and the transportation agencies of the country strain every nerve to facilitate distribution, the war demand for fuel will inevitably outstrip the possible output.

Every time a fifteen thousand-ton troop-ship carries American soldiers to the fighting front in France it consumes about three thousand tons of coal or 12,000 barrels of fuel oil. More than four million tons of coal are consumed in a year in transporting the supplies which must go forth in a continuous stream to maintain a single army. Our present shipbuilding program will demand fourteen million tons of coal merely to manufacture and transport the steel to be used in ship construction; and, in building eight million tons of vessels we will use nearly five tons of coal for every ton of shipping that leaves the ways. Every three-inch shell fired from an American gun in the war against autocracy represents eighty pounds of coal used in its manufacture, and these shells are manufactured by the million.

With this enormous war demand added to the normal coal consumption of our railroads, industries and people, the United States is confronted with the necessity of supplying approximately 735,000,000 tons of coal during the coal year from April 1, 1918, to April 1, 1919. Of this amount about 100,000,000 net tons—a maximum year's production—come from the anthracite fields and will go largely to keep the people warm. The remaining 635,000,000 tons must come from the bituminous fields. The production of bituminous coal in 1917 was 554,000,000 tons—in 1916 it was a little more than 500,000,000. The gap between last year's production and this year's demands (at least 80,000,000 tons), must be bridged.

Two factors limit the production of bituminous coal. The first of these is transportation. Bituminous coal cannot be dug from the ground and stored at the mine. Every hour that a mine produces coal there must be available at the mouth of the mine railroad cars to carry the product away. If the cars are not there, production stops. The tremendous pressure on the railroads for the transportation of war supplies and the consequent congestion of all eastern carriers which characterized our first year's war activities operated to slow down the movement of coal cars and therefore to limit production.

The production of coal hand in hand with railroad service increased tremendously during June and July of 1918. Records for bituminous production were established which the coal mining industry had never approached before.

As the railroad service improves, a heavy burden is laid upon the labor in the mines which must produce the coal. With the ranks of mine labor depleted by the demand for active service in the fighting line and by the movement of labor to more remunerative work in war industry, there has developed the task of increasing the efficiency and output of the individual miner. To this end the Fuel Administration is now bending every effort.

Production Not Sufficient

But it is apparent that the entire demand for coal cannot be filled by increased production. We must, therefore, overcome a part of the difference between the supply and demand by conservation. The time has come when the United States must exercise rigid economy in its use of fuel. Our lax habits, the outgrowth of years of plentiful coal supply, caused our combined waste to mount up enormously. Unless voluntary conservation effects the necessary saving many of the non-war industries will have to be curtailed or shut down in order that the fuel they consume may be taken to fill the ever-increasing demands of our great war machine. Conservation can prevent this. Those who save are the ones who help toward avoiding unemployment and the attendant evils which follow curtailment of industry.

There will be enough coal supplied for the reasonable domestic needs of those communities that have heeded the nation-wide warning to order early. The war machine will get all the coal it needs, and other industries will receive coal in proportion to their importance. Conservation on the part of all true Americans is a patriotic necessity.

Oil Problem Also One of Transportation

Next in importance to coal as fuel is petroleum, which is destined as the supply increases to become more important in its relationship to the manufacturing world than heretofore. Of the many products of petroleum, fuel oil and gasoline are the two principal liquid fuels. Our absolute dependency on gasoline is well understood, but the importance of fuel oil is not so widely appreciated.

Principally in these war times fuel oil becomes a necessity in connection with shell and gun making, as without it heat testing, annealing, etc., would be impossible. As a steam generating fuel, it has many advantages over coal. An equal weight of fuel oil, as compared with coal, will give more heat, no smoke, require less man-power to handle it, and as a ship-fuel occupies much less bunker space.

The problem of increasing the supply of petroleum is one largely of transportation, which is being solved as the new tank ships constructed by the Emergency Fleet Corporation are put into commission.

As to the permanency of its supply, the amount in the ground is entirely problematical. Stocks of petroleum have been constantly decreasing in volume since 1915, owing to the enormously increased demand, but the supplies from overseas and Mexico will greatly relieve the situation. There is no reason to doubt the ability of the petroleum industry to meet the nation's needs during the period of the war, but the output of petroleum must be continually increased, otherwise the reserve stocks will be depleted.

CREATION OF FUEL ADMINISTRATION

On August 10, 1917, the President approved the law passed by Congress known as the Lever Act, which confers upon the President the power to deal with the fuel situation. Acting under its authority, on August 21, he fixed a schedule of provisional prices at which bituminous coal not under contract should be sold and on August 23, in a similar way, he fixed the prices for anthracite coal. On August 23 he appointed Harry A. Garfield as United States Fuel Administrator.

An investigation of the coal industry had been conducted in 1917 by the Federal Trade Commission, pursuant to resolutions adopted by Congress, and on May 19 the Commission transmitted a preliminary report to the House of Representatives in which it was pointed out that the underlying causes of the abnormal bituminous coal situation were:

> Increased demand for coal, shifting markets, inadequate transportation facilities, labor conditions, increased costs of production and distribution, lack of sufficient storage facilities, and speculative activities of some mine operators and brokers.

In a more detailed report on anthracite and bituminous coal, transmitted to the Senate on June 19, 1917 (Senate Doc. No. 70), the following recommendations were embodied:

> (1) That the production and distribution of coal and coke be conducted through a pool in the hands of a Government agency; that the producers of various grades of fuel be paid their full cost of production plus a uniform profit per ton (with due allowance for quality of product and efficiency of service).
>
> (2) That the transportation agencies of the United States, both rail and water, be similarly pooled and operated on Government account, under the direction of the President, and that all such means of transportation be operated as a unit, the owning corporations being paid a just and fair compensation which would cover normal net profit, upkeep and betterments.

The average price of bituminous coal during the year ending December 31, 1916, was from One dollar twenty-five cents to One dollar fifty cents per ton at the mines. During the latter part of that year the prices advanced and continued to rise until during the summer of 1917 they reached the abnormally high figure of Seven to Eight dollars per ton for spot coal with every prospect of continued advance.

The unequal distribution caused by the competition for coal at any price, and the consequent preference in supply to those who could afford to pay, threatened to leave without fuel those who were not financially able or sufficiently influential to compete for a supply, thus creating a condition, as result of unbridled competition, of particular hardship to the domestic consumers and of significant embarrassment in the prosecution of the war.

Another feature which had manifested itself was the demands of labor to share in the increased profits resulting from higher prices prevailing, and some advances had already been made. Therefore, the Government decided to assume control of the situation.

BITUMINOUS COAL NEEDED IN 1918-19

From a census of the war industries and similar activities, undertaken by the United States Fuel Administration in May, 1918, estimates were compiled as the basis for an announcement, made on June 6, that the fuel needs of the country have increased so enormously since the declaration of war that the production of bituminous coal during the year beginning April 1, 1918, must be increased by 79,866,000 net tons over the production of 1917, if estimated requirements are met. Unless this added production is accomplished, the requirements must be curtailed by conservation and by further limitation of the supply of coal permitted to be used by non-war industries.

The ever-increasing fuel demand of the war machine has sent up the figures for the bituminous requirements for the current year to 634,594,000 net tons, while the production during 1917 was only 554,728,000 net tons, although all previous production records were then broken by more than 52,000,000 tons. To meet the requirements an average weekly production of more than 12,200,000 tons was sure to be necessary throughout the coal year. On June 1, the first nine weeks of the coal year had expired and at that time the average weekly production had been so far below the requirement that for the remaining forty-three weeks of the coal year an average weekly production of more than 12,400,000 net tons was the program necessary for fulfilling bituminous requirements.

The percentage of production, figuring total capacity of 100 per cent., had been varying during April and May from about 63 to 77 per cent., meaning that the total losses from all causes from 100% capacity had been 23 to 37 per cent. Of these losses car shortage had caused from 11% to 18%. During the first nine weeks of the coal year the average losses from all causes were about 26%, of which the single cause of car shortage caused 13%. The remaining 13% of losses were caused by: Labor shortage, 5.8%; mine disability, 3.2%; lack of orders, 1.6%, and all other causes, 2.4%. These percentages were figured on the country as a whole. In various districts the car shortage had been at different times during this period, often above fifty per cent. and had risen as high as 59.5%. Labor shortage some weeks in other districts had risen a few times above 20% and once as high as 31.1%.

Beginning with the week ended June 8, all these percentages showed a decided improvement towards aiding production. Percentages of capacity jumped that week to 82.3 and car shortage dropped to 7.8 per cent. Also the "Order Early" campaign had caused the loss from lack of orders to drop below one per cent.

The most strenuous efforts to increase production had been exerted in many ways and its continuation met most gratifying response when the records for the succeeding weeks' production surpassed anything ever before accomplished. They were as follows:

Week ended June 8	....	12,427,000	net tons
" " June 15	....	12,606,000	" "
" " June 22	....	11,990,000	" "
" " June 29	....	12,344,000	" "
" " July 6	(five days).....	10,252,000	" "
" " July 13	....	13,273,000	" "
" " July 20	....	*12,956,000	" "

* Subject to slight revision.

These remarkable records were made in the face of the fact that the number of mine-workers had been depleted by thousands.

Rigid conservation throughout the country, however, was a self-evident necessity, and it was apparent that more radical curtailment than ever before of the supply of fuel to industries not essential to the carrying on of the war, must be enforced. The analysis of the country's needs for the current year, compared with the consumption of the previous year, compiled and made public on June 6, was as follows:

Class of Use	Required 1918-19 Net Tons	Consumed 1917 Net Tons	Per Cent. Increase
Industrial	249,025,000	204,907,000	18
Domestic	75,678,000	66,915,000	13
Gas and electric public utilities	37,941,000	33,038,000	15
Railroads	166,000,000	155,000,000	7
Exports	24,000,000	24,000,000	..
Beehive Coke	52,450,000	52,450,000	..
Bunker—Foreign	10,000,000	7,700,000	30
Bunker—Domestic, inc. Gt. Lakes	5,000,000	5,000,000	..
Power and heat at coal mines	12,500,000	11,000,000	14
Substitution of coal for oil, mainly in the Northwest	2,000,000	....	..
TOTALS	634,594,000	560,010,000	13.32
Deduct: Imports	....	907,000	
" Used from storage	....	4,375,000	
NET TONS OF PRODUCTION	634,594,000	554,728,000	14.4
Increased requirements over 1917	....	79,866,000	14.4

SHIPMENTS OF ANTHRACITE COAL

Reported by the Anthracite Bureau of Information, Philadelphia. Figures are in gross tons of 2,240 lbs.:

	1917	1918
January	5,940,725	5,638,383
February	5,178,432	5,812,082
March	6,989,075	7,276,777
Three months' total	18,108,232	18,727,242
April	5,592,299	6,368,373
May	6,917,525	6,887,256
June	7,049,037	6,867,669
Six months' total	37,667,093	38,850,540
July	6,724,252	
August	7,013,996	
September	6,372,756	
October	7,110,950	
November	6,545,313	
December	5,698,945	
Total for year	77,133,305	

Reduced to net tons, of 2,000 lbs., and adding to these shipments the amount used for heat and power at the mines and in mining towns, the authentic estimate for 1917 is that the total anthracite production was 100,000,000 net tons.

ANTHRACITE ALLOTMENTS FOR 1918-19

After completing a thorough investigation as to the prospective anthracite coal production during the coal year of 1918-19, and after taking into consideration the uses it best serves and to what sections it can be transported most readily from the anthracite region, the United States Fuel Administration on June 1, 1918, announced an apportionment of the anthracite production to the various consuming sections.

Increased allotments over the distribution of the preceding year were made to New England and the Atlantic states, to meet the greater requirements of their largely expanded population. Allotments for the central and north-central states and Canada were reduced and the supply cut off entirely from the trans-Mississippi territory and the southern and western states, on account of the necessity of first supplying the congested area near the anthracite production regions and thus reducing transportation.

It was figured that a total of 54,345,783 gross tons, 60,867,177 net tons, of domestic sizes would be available for distribution to domestic consumers during the coal year. The remainder of the anthracite production will be needed to meet the requirements of the war industries and utilities and the army and navy. To make possible the increased distribution where necessary, there was no alternative but to curtail or cut off states where bituminous could be substituted. The results from this program, compared with the coal year of 1916-17, show:

Increased production	2,668,323	Gross tons (2240 lbs.)
Curtailment in distribution	2,202,288	" " "
Gain from barred sections	765,931	" " "
Total gained	5,636,542	" " "
Less Army and Navy, camps and cantonments...	600,000	" " "
New balance available.	5,036,542	" " "

The available freed balance will enable an increase of 1,497,621 tons in the amount to go to New England, and of 3,538,921 tons, for the Atlantic States.

The Fuel Administrators for the New England states figure the probable demand at 10,699,400 tons for domestic requirements. They were allotted 10,331,000 tons of domestic sizes. The Fuel Administrators of the Atlantic states asked for a total of 33,413,621 tons. They were allotted 31,417,154 tons.

Compared with the actual distribution for the coal year 1916-17 the allotment of domestic anthracite for all purposes was, in gross tons (2,240 lbs.), as follows:

	1916-1917 Distribution	Allotment 1918-19	Per Cent. of Increase	Per Cent. of Decrease
New England	8,833,379	10,331,000	16.95	......
Atlantic States	27,878,233	31,417,154	12.69	......
Central States	5,100,024	3,481,945	.....	31.73
Northwest	2,710,188	2,380,000	.....	12.18
*Trans-Mississippi	627,965	....	.....	100.00
The 24 Remaining States...	137,966	....	.....	100.00
R. R. Supply	2,481,754	2,481,754	.....	......
Canada	3,856,021	3,602,000	.....	6.59
Miscellaneous Exports	51,930	51,930	.....	......
Army and Navy Camps and Cantonments	.....	600,000	.....	......
	51,677,460	54,345,783	5.16	......

* Since the allotment made on June 1, 1918, there has been enough saved from the estimate to allow an allotment of 146,000 tons to Iowa.

The war, by reason of the army draft and in many less direct ways, has seriously affected the army of anthracite workers, reducing the ranks steadily from 176,552 in 1915 to about 145,000 this spring. This force will be even more greatly reduced, it is feared.

When the coal year started, April 1, 1918, there was absolutely no stock of anthracite left over. All demands, increased as they were, have got to be met out of current production and this in face of the fact that it appears impossible to get out materially more than the maximum amount shipped last year, which even then proved insufficient to supply the country's demands.

BUREAU TO STIMULATE PRODUCTION

The organization of the Production Bureau of the United States Fuel Administration, headed by James B. Neale, who had been acting as anthracite advisor to Administrator Garfield, was announced on June 7, 1918. This Bureau took over for expansion the numerous activities directed toward increasing the volume of coal mined and coke produced, and an intensive campaign to stimulate production was inaugurated.

The situation then was, that while a weekly average of about 11,700,000 tons of bituminous coal had been produced during May, the coal requirements of the war industries had increased to a point where, to avoid shortage, the weekly average must be raised about 1,000,000 tons for the rest of the current coal year.

The Production Bureau concentrated special efforts upon increasing efficiency of individual mines and miners, in both bituminous and anthracite industries in order to accomplish the greatest possible output with the labor and mining facilities available.

The result of the work to stimulate production, while apparent to students of statistics during April and May, and even earlier, began to be widely noticed when the bituminous production of 12,427,000 tons during the first week of June was announced. From then on a steady output exceeding two million tons per day was maintained, even though a smaller force of men was working.

A committee was appointed in Washington to work in conjunction with the War Industries Board to obtain priority for material or equipment needed by mines.

In connection with this campaign, looking to 100 per cent. coal production, John P. White, Labor Representative in the Fuel Administration, a former president of the United Mine Workers, delivered a series of addresses late in June, in Pennsylvania and Maryland, with the object of stirring both operators and miners to the utmost activity. This campaign extended to all coal producing fields. Several survivors of the present war, returned from France, toured the numerous fields and addressed the miners.

One of the early steps taken by the Production Bureau was the appointment of a special production committee in each mine. There are six members, three of them chosen by the mine operators and three by the mine workers. Each committeeman has a personal certificate of his appointment signed by the Fuel Administrator, and by Mr. Neale.

The work of the production committee is to urge all mine workers to work eight hours a day, six days a week, to keep track of individual workers, to report on the amount of work accomplished, the number of tons of coal produced, and if there are shortages of hours or absences, to report on the cause of these.

To enhance production, miners were encouraged to work on Liberty Loan Day, April 26, 1918, although it had been proclaimed a nationwide holiday. On the day before, Fuel Administrator Garfield sent a telegram to various operators and mine workers' officials, as follows:

> I have consulted with President Wilson, who is quite willing that miners should continue at work tomorrow wherever cars are available, on the ground that coal is a basic necessity and that this labor will not be regarded as contrary to his proclamation.

On July 1, 1918, Administrator Garfield sent out an appeal to all miners to confine their Fourth of July celebration to one day, and this appeal was generally observed.

Miners Now to Work on Funeral Days

It has been the custom in the anthracite coal fields for many years for employees to remain away from work on the funeral day of any fellow worker who has been killed at a colliery. In order to prevent loss of tonnage which follows observance of this custom, operators and the leaders of the mine workers agreed in July of 1918 that a committee of six shall be appointed to attend each such funeral and the company is to pay the day's wages of the men on the committee. In addition the companies agreed to pay the nearest heirs of the worker killed the sum of $150 over and above the compensation allowed by law.

Carnival Cancelled to Aid Production

At Spangler, Pennsylvania, a Firemen's Convention and week's carnival scheduled for Cambria County, beginning August 11, was cancelled at the request of James B. Neale, Director of Production for the Fuel Administration, who urged the abandonment of the plans, saying: "We cannot afford to lose one ton of coal which can possibly be mined." By telegraph a patriotic response came stating that the proposed convention had been cancelled. Appreciation of this action was expressed by Mr. Garfield and Mr. Neale in communications to J. G. Nicholson, Barnesboro, Pa.

Reports of District Representatives to the Fuel Administration during July showed records going by the board in many instances, indicating that operators and mine workers were a unit in their industrial drive for victory.

DOMESTIC CONSUMPTION UNDER CONTROL

Because it was evident that there would not be enough household coal available during the winter of 1918-1919, if the previous year's waste continued, or if unequal distribution was not prevented, the Fuel Administration, early in July, 1918, took steps to provide, in the discretion of State Administrators, that the coal allowed to each consumer would be only so much as was scientifically found sufficient to heat his house to 68 degrees, with every conservation rule obeyed. Under this system every one was assured of his fair proportion of coal.

This system was originally worked out and applied in Philadelphia. It proved an unqualified success and, with modifications suggested by the experiences in that city, the adoption and enforcement was referred to the Federal Fuel Administration in all States. This plan involves a department of coal allotments in connection with each local fuel administrator's office.

FEWER MINERS NOW WORKING

Fear of a shortage of coal miners on account of war drafts and the demands of shipbuilding, steel-making and war industries in general served greatly to enhance the necessity for all consumers to get their coal supply into their bins at the earliest possible moment. The United States Fuel Administration sounded this warning early in the spring of 1918.

There were many less miners working than for several years previous, and every effort was made to keep the force supplied with orders and cars so there would be less idleness during the summer season than formerly. These efforts so far have been meeting with considerable success.

Increased demand for coal production, increased demand for cars which haul the coal and depletion of the number of men at work in the coal fields are three vital conditions the country is facing, and the problems arising are ones which must in some way be overcome.

To relieve the shortage of labor, operators in the coal regions are urging that young men who are at school during the winter, but who can work during the summer, should serve their country by getting positions at the mines. If the boys can help accumulate reserve coal supply to meet winter emergencies, they will be doing good service to America.

The importance of solving our coal problems at this time, by the cooperation of everyone, is aptly expressed by *Financial America*, as follows:

> The coal industry is the most vital one in the world, in that it creates power, without which there could be no real progress. The cry is for increased production to meet the greatly enlarged needs consequent upon war.
>
> It is coal that keeps up the steam in the boiler, drives the engines and keeps the wheels of war industry turning. It is coal that enables the railroads to deliver the country's vast contributions of men and war supplies at our seaports, and coal that drives our ships bearing this aid to democracy's forces across the ocean.
>
> Miners are needed here to support the army in France. The 24,000 already drafted and missing from the anthracite fields from other causes have proved their worth and ability in the training camps.
>
> The new draft should be applied with a light hand to this essential industry if these workers cannot, like the shipbuilders, be exempted from service in the field. The same consideration in the matter of labor is due the coal industry that is due to the farms. The failure of either would inflict a disaster equal to the loss of a campaign in Europe.

As an illustration of what a miner can do under the highly-developed working conditions which have been created in the anthracite industry, the wonderful record of Marion Urbin for one month may be cited. In the Bliss colliery of the Lehigh & Wilkes-Barre Coal Co., he mined 350 cars of coal. He had to remove 58 cars of rock, a total of 408 cars. His earnings were $350 for the month.

Bureau of Gas Plants Created

Announcement was made on June 25, 1918, of the creation of the Bureau of Gas Plants of the Fuel Administration and the appointment of James T. Lynn. of Detroit, Michigan, as director. This bureau has supervision of the regulation of the artificial gas industry, in so far as it affects the consumption of fuel.

OPENING OF NEW MINES

The United States Fuel Administration announced in May, 1918, a policy of encouraging the opening of new coal mines, whenever it appears to its satisfaction that this can be accomplished without taking labor from mines already developed and capable of producing more coal than at present, and when it appears that the net result will be an increased production of coal in the entire field.

Transportation, also, must be arranged for because, from a commercial viewpoint, coal is not produced until it is loaded into railroad cars at the tipple. The Fuel Administration, therefore, is unwilling to approve the opening of the new mines, if it appears to the United States Railroad Administration impossible or inexpedient to furnish the necessary railroad facilities. All applications for the development of new mines must be taken up in the first instance with the Fuel Administration.

INDUCEMENT TO BUY COAL EARLY

To encourage the early buying and storage of coal for domestic use, the United States Fuel Administration in March, 1918, issued regulations covering retail distribution for the year beginning April 1. The plan had the indorsement of the National Retail Coal Merchants' Association, which organization agreed to cooperate in enforcement. The idea was to keep the mines and railroads busy all summer to prevent a winter shortage.

Most mines, customarily, produce less coal during the summer months because there is no demand in the domestic market. Many mines in other years have been shut down entirely between spring and early autumn. The "Order Early" campaign was for the purpose of creating a domestic market throughout the summer, and purpose was completely accomplished.

A general reduction of thirty cents per ton at the mines in the price of anthracite, 75 per cent. of which is used for domestic purposes, was announced to be effective from April 1 to September 1. The regulations provided:

> Every coal consumer should place with his dealer on or before April 1st a written statement of his requirements for the year beginning April 1st, which he shall declare to be correct. The statement shall show (1) the amount of coal the consumer has on hand, (2) the amount of coal he has on order and the name of the person from whom ordered, (3) the amount of coal used by him in the 12 months ending March 31, 1918, and (4) the amount of coal needed to meet his actual and necessary requirements prior to March 31, 1919: Provided, however, That this regulation may be modified by any State Fuel Administrator within his own State.

Delivery of car-load or barge-load lots to a single domestic consumer or a group of consumers, was prohibited except with the permission of the local Fuel Administrator.

Attention was called to the penalties imposed under the Lever act, carrying both fines and imprisonment for violations of the regulations by dealers or consumers.

WAGE AGREEMENT SETTLED STRIKES

To settle numerous strikes that were on hand when the United States Fuel Administration was organized, and to promote a more harmonious condition at the mines, a conference of miners and operators was held in Washington, beginning October 6, 1917.

The outcome of the conference was a supplemental agreement to be appended to existing agreements between the operators and miners.

Under the agreement, bituminous mines adopting it were allowed an increased price of forty-five cents per ton, to cover increased wages. The miners were obligated by it not to strike or to cease working without cause. The agreement carried a penalty enforceable against the miners and operators for non-compliance. It also directed the strengthening of existing agreements to make the penalty more effective.

All fines imposed under the agreement are collected automatically, and operators refusing or neglecting to make the collections are subject to a fine of two dollars for each employee subject to be fined. No fines are permitted to be refunded except by mutual agreement of the accredited representatives of the miners and operators.

This agreement was first adopted in the districts comprising the Central Competitive Field, which is the field of largest importance, and includes Illinois, Ohio, Indiana and Western Pennsylvania. The agreement has been extended since to other fields. In the bituminous field the penalties have been fixed by mutual agreement in each of the mining districts.

In the anthracite region a blanket agreement was made prescribing specified penalties throughout the fields and the Government allowed the anthracite operators an increase of 35 cents a ton in the selling price at the mines.

Fuel Administration Labor Bureau Created

At a conference held in Washington, D. C., between Fuel Administrator Garfield and the international officials of the United Mine Workers of America, a complete understanding was reached wherein all questions pertaining to labor in the coal mining industry will remain under the jurisdiction of the United States Fuel Administrator. This is in accordance with an understanding previously reached between the Secretary of Labor and the Fuel Administrator.

To make this arrangement effective, the Fuel Administrator created a Bureau of Labor, to which all matters relating to labor controversies will be referred for settlement. John P. White, formerly president of the United Mine Workers of America, and Rembrandt Peale, coal operator for Central Pennsylvania, were appointed joint heads of this bureau, with power as deputies of the Fuel Administrator to consider and dispose of all matters concerning labor in the coal mining industry properly coming before the Fuel Administration and subject to the procedure prescribed in existing joint agreements.

A statement of principles was made by Mr. Garfield at conferences at which were present Frank J. Hayes, president; John L. Lewis, vice-president; William Green, secretary and treasurer, of the United Mine Workers of America; and John P. White and Rembrandt Peale, representing the Fuel Administration, all of whom acquiesced in the statement as expressing their understanding of the principles followed by the Fuel Administration and by the International Union of Mine Workers in settling questions relating to labor in the coal-mining industry.

It was understood that wherever the Federal Government is called upon to intervene, or of its own motion intervenes, in the settlement of such questions, whether in organized or unorganized fields, jurisdiction shall remain until otherwise arranged, in the hands of the Fuel Administrator.

ORDER TO INSURE CLEANING OF COAL

The United States Fuel Administration in March, 1918, announced the organization of an inspection system to enforce the mining and shipping of clean coal.

Subsequently, under an order effective June 1, 1918, coal condemned by the Fuel Administration for lacking preparation, or because it contains a large percentage of impurities must be sold at 50 cents per ton less than the fixed Government price for the mine.

Authority was given to the district representatives of the Fuel Administration to appoint inspectors of knowledge and experience, to inspect the product of the various mines, and with sufficient authority to enforce the cleaning of coal at the mines. They were empowered to order the suspension of operation in mines where the coal was found naturally to be of such character as to be unfit for market. The order did not change the terms, conditions, or validity of existing contracts, but new contracts were made subject to it.

BITUMINOUS ZONE SYSTEM

The United States Fuel Administration, cooperating with the Director-General of Railroads, announced in March, 1918, a zone system, to cover the distribution of bituminous coal during the coal year beginning April 1, 1918. To avoid waste of transportation is the purpose of the system.

The system provides for the retention of something like 5,000,000 tons of coal for the East which has heretofore gone west. It will eliminate the movement of more than 2,000,000 tons of Pocahontas coal to Chicago and other western points over a haul of about 660 miles. Chicago can make up this shortage from southern Illinois mines, with an average rail haul of 312 miles. Thus, there will be saved 11,400,000 car-miles, or, conservatively figured, 285,000 car-days. This will permit 14 additional round trips of 20 days each from West Virginia to zone destinations, permitting an addtonal production of at least 700,000 tons of Pocahontas and New River coal.

Similar comparisons show that on the movement of 550,000 tons annually from Kanawha districts to Wisconsin points there can be saved about 2,500,000 car-miles, with a consequent increased production of some 300,000 tons. On the movement from southeastern Kentucky to Chicago the saving will be about 800,000 car-miles and 50,000 tons production. The elimination of the Indiana-to-Iowa movement will save 1,600,000 car-miles and permit 100,000 tons additional production. These are only a few instances of transportation saving effected by the system.

Coal of particular quality or characteristics for special uses, such as by-product, coke, gas, blacksmith, or metallurgical coal, is permitted to move by permit beyond the limits imposed by the zone system. Applications for permits must be made to the Zone Permit Bureau of the United States Fuel Administration in Washington.

The method of enforcing the zone system is that the Fuel Administrator prohibits distribution beyond the limits of each zone, and the railroad administration supplements these prohibitions by railroad embargoes. When permits shall be issued by the Fuel Administrator to admit of distribution beyond the zone limits such permits operate as exemptions from the embargoes and the embargoes so provide.

A complete list of the restrictions imposed by the zone system, by States, is in the hands of State Fuel Administrators.

West Virginia Coal for the East

To meet the constantly growing demand for coal for war industries in the eastern section of the United States, the Fuel Administration issued an order effective June 20, 1918, making restrictions on westbound movements of bituminous coal from the Kanawha and Kenova-Thacker districts of West Virginia. The order prohibits the movement of coal mined east of St. Albans, on the Chesapeake & Ohio Railway, to points west. By-product coal and coal intended for the manufacture of gas or for other special purposes may be moved west from these fields only when consumers have procured a permit from the Coal Zone Permit Bureau of the United States Fuel Administration. Public utilities and similar plants which now have contracts with mines in this section may also secure permits for the west-bound shipment of coal.

RULING CONTROLS PRICES AFFECTED BY FREIGHT RATES

A regulation prohibiting coal distributors and dealers from adding to the price they charge for coal any increased freight rate which the dealers or distributors have not actually paid or become obligated to pay, was issued on June 24, 1918, by the Fuel Administration. A general increase in freight rates on coal became effective June 25. On that date large stocks of coal were in the hands of dealers who had paid the old freight rate. These dealers were not allowed to increase their selling prices on this coal to include the new increased rate. The regulation also applied to coal shipped to the various "pools" at tidewater.

Every three-inch shell that we fire in France means a consumption of 80 pounds of coal.

WAR INDUSTRY MUST SPREAD WEST AND SOUTH

As a means of relieving congestion of traffic lines and of manufacturing conditions in the northeastern portion of the country, the War Industries Board, the United States Fuel Administration and the United States Railroad Administration announced, on June 12, 1918, a policy of limiting new production within this district.

The congested area comprises the New England States; Eastern and Southeastern New York as far west as Binghamton; Pennsylvania, as far west as Williamsport, Altoona and Harrisburg; all of New Jersey, all of Delaware, and Eastern Maryland, not including Baltimore.

Under the policy now inaugurated further increase in the volume of war orders and the number of establishments handling them, will be prevented, except in unavoidable cases or through inability to otherwise provide for war needs, and in such cases the supply of coal to existing plants in the same district will have to be curtailed.

The matter of moving coal and raw materials into the congested area, as well as of transporting the finished product away, is one of the most difficult problems with which the Government has to deal. A careful analysis shows that the increased industrial activity in this area has created requirements which exceed the limit of possible transportation of coal and necessary materials for manufacture.

To overcome the difficulties presented by this condition, the War Industries Board and the Fuel Administration have undertaken to limit manufacture in the congested district to the present status of output, and have new orders placed in territory farther west and south.

Population Congested in Anthracite Consuming States

Detailed census statistics of the influx of population to the now congested area of the northeast would undoubtedly show that millions of persons have moved from other sections, since the beginning of European hostilities, to the industrial centers in the anthracite consuming region of the United States.

A table, prepared last year by the Provost Marshal General in connection with the application of the selective draft law, showed an increase in population of nearly five millions at that time over the figures of 1910, for the states of the Northeast where large war industries are located. The figures are as follows:

	1910	1917
Connecticut	1,114,756	1,719,623
Delaware	202,322	234,710
Dist. of Columbia	331,069	346,856
Maine	742,371	646,588
Maryland	1,295,346	1,292,091
Massachusetts	3,693,310	3,939,561
New Hampshire	430,572	403,884
New Jersey	2,537,167	3,255,407
New York	9,113,614	11,187,798
Pennsylvania	7,665,111	8,981,082
Rhode Island	595,986	573,583
Vermont	355,956	296,426
Total	28,077,580	32,877,609
		28,077,580
Total increase		4,800,029

CONTROL OF FUEL IN EUROPE

As a war measure the belligerent countries of Europe have been forced to take radical steps in order to insure an advantageous use of their coal resources.

The coal mines of Great Britain and Ireland were placed under Government control early in 1917. All dividends paid and all wage agreements must be approved by the Government. On account of the advance in cost of food and other necessities of living, which is figured there to average 94 per cent., increase in prices of coal amounting to from $1.00 to $1.60 per ton have been authorized. Army and Navy requirements and other Government industries, including munition plants and railroads, are given priority in the distribution of coal and the allotment of cars.

At the beginning of the war about 240,000 miners of the United Kingdom, out of a total of about one million, enlisted in the army, and the industry was seriously crippled for a time. The government tried to have these men returned to the mines but less than twenty thousand were sent back. Then a regulation was put in force providing that no miner could enlist in the war without the approval of a local board established in each district to pass upon enlistments. The result was that men employed in various other occupations immediately applied for work in the mines.

Conservation in Great Britain is governed by drastic rules. If cinders are found in the dust-bin of any consumer he is liable to six months' imprisonment. No one can consume more than 22½ tons per year without a special permit. For 1917 the winter ration scale allowed the use of 200 pounds per week for four rooms; one ton per month for seven rooms; and up to two tons per month for 15 rooms. Half rations are permitted in summer. If one person's ration is ten tons a year and he buys eleven he is liable to prosecution.

England has also recently curtailed the use of fuel oil as well as gasoline and gas for pleasure automobiles.

The French and Italian governments have assumed complete control of distribution. In May, 1917, the Russian provisional government took over the coal mines of that country for the purpose of controlling distribution and prices. Fuel is so scarce in France that during the winter of 1917-18 the amount of coal allowed to domestic consumers was approximately 11 kilos, or 24 pounds, per month. The colder sections received a larger amount and the warmer sections a smaller amount, but in all cases the allowances were much less than the minimum requirements for comfort. Strict limitations were imposed on the consumption of gas and electricity.

Since the loss of Alsace-Lorraine, France produced, before the present war, only about two-thirds of the coal she consumed, and now the portions under invasion contain her principal coal mines. This has made necessary more extensive exploitation of other mines. In 1913 she used about 65,000,000 tons, of which she produced about 45,000,000 tons and imported the balance from Great Britain, Germany and Belgium. In 1916 her consumption was curtailed to about 40,000,000 tons, of which she produced 24,000,000 tons and imported 16,000,000 tons. Her production has increased remarkably during the last eighteen months, and for the year 1917 it is estimated to have been 30,800,000 tons.

Early in the war Germany centralized the entire coal industry under government control. In Berlin a new plan of distribution was put in force in May, 1918. Its chief feature is that a dealer is obliged to supply customers in exact accordance with tickets presented, these being issued by the government. There are two kinds of tickets, one for cooking and one for heating coal. For cooking, a family of one or two persons is allowed 1,200 pounds; three to six, 1,600; seven to ten, 3,200. As to coal for heating, one room is allowed 500 pounds, two rooms 1,000, and so on up to 6,000 pounds. Persons who used more than six tons for heating last winter will be allowed just half what they used then.

BEST OF COAL FOR THE SHIPS

Strict regulations govern the shipments to the Atlantic seaboard of coal intended for the bunkering of ships. Only the highest grade of coal for steam-making purposes is permitted to be used for this service, to the end that each ship shall have a greater steaming radius and higher speed from a given bulk and weight.

Under regulations issued in April, 1918, by Fuel Administrator Garfield, it is prohibited that coal be delivered to any Atlantic or Gulf port for bunkering purposes other than that specified by the Fuel Administration as permissible bunker coal. The shipment of coal smaller than run of mine, to any port for bunkering purposes, or to any pool designated as a "permissible coal pool," is expressly prohibited except when special permission is granted by the Fuel Administration. On July 2, 1918, twenty-five additional inspectors were appointed to help supervise more thoroughly the preparation of coal for ships.

Orders issued by the Fuel Administration, effective July 23 and July 31, 1918, revised former regulations relative to the required quality and grades of coal for bunkering steamships. The purpose of the orders was to improve the quality and enlarge the quantity of coal for ships in the Atlantic trade.

An order was issued by the Fuel Administration on July 18, 1918, prohibiting any person owning or operating a dock on Lake Michigan or Lake Superior from selling, shipping, delivering or distributing smokeless coal received at any such dock from the New River, Pocahontas, Tug River or other field producing low volatile smokeless coal for any purpose other than making illuminating gas, by-product coke or coal briquettes, or for such other special purposes as may be designated by the Fuel Administration, by special permits. Such permits must be obtained from the District Representative of the Fuel Administration in charge of docks on Lake Michigan and Lake Superior.

HIGHER PRICES FOR EXPORT AND BUNKER COAL

An order relative to prices for coal for foreign bunkering purposes and export cargoes was issued by the United States Fuel Administration on December 13, 1917. It provides:

> The maximum price of coal sold and delivered to vessels for foreign bunkering purposes or for export to foreign countries, except to Canada and Mexico, shall be the price prescribed for such coal at the mine at the time such coal left the mine plus transportation charges from the mine to port of loading, plus $1.35 per ton of 2,000 pounds.
>
> To this price, computed as above, the seller of the coal, or such other agency as performs the actual work of bunkering or loading the vessel, may add the customary and proper charges, if any, for storage, towing, elevation, trimming, special unloading, and other port charges, and is subject to all present and future regulations of the United States Government.

Exports to Canada

During the first three months of 1918 permits were issued by the Fuel Administration to a large number of coal operators allowing exports of coal to Canada. These permits covered the months of April, May and June. No export licenses were required for individual shipments into the Dominion but the allotments as given in the permits limit the amount that shippers are at liberty to send during that period.

C. A. Magrath, Fuel Controller for Canada, with headquarters in Ottawa, was granted considerable tonnage, and the privilege for the period mentioned, to call upon the Fuel Administration to issue permits to any shippers who apply to him.

Allotments of coal to Canada during 1917 were upon the same basis as if Canada were one of the States of the Union. The mines of British Columbia furnish considerable coal to the northwestern part of the United States.

Coke for Export

Because of the fact that the handling of coke for export involves certain expenses for assembling, loading, selling, and financing, regulation was issued by the Fuel Administration, permitting the adding of 60 cents per ton of 2,000 pounds to the Government price. This price applies to coke for export to foreign countries or to a possession or dependency of the United States. The operator may also add to this the cost of transportation from the ovens to the port of loading.

Anthracite Exports Restricted

Shipments of anthracite coal to Canada during the present coal year have been restricted by the United States Fuel Administration, in cooperation with the Fuel Controller of Canada, after a conference of operators, miners and railway officials in Canada. Supplies to points in western Canada are materially restricted. The Canadian public is warned that conservation must be practiced to the utmost extent.

The Nation relies on its 250,000 industrial and railroad firemen, and the 15,000,000 household firemen, to stop that waste and save the day.

FIXING OF MINE PRICES

While our coal resources are plentiful and a generous supply could be brought to the mouth of mines with the labor available, when transportation is clogged this becomes a limiting factor, because coal cannot be called produced until it is delivered. The problem of the Fuel Administration is, therefore, to use the available supply to bring to the mouth of the mine the best coal obtainable in such quantities as the railways can transport.

To accomplish this result prices have been so fixed as to offer a fair profit to reasonably efficient operators who are working veins of merchantable coal, without encouraging the development or operation of mines that produce inferior coal or that operate only at high cost.

Before undertaking a revision of prices, the Fuel Administration makes inquiries and obtains detailed statements under oath by the operators on standard forms known as cost sheets, together with a thorough investigation by agents of the Fuel Administration not only with references to the data submitted, but also covering general conditions in the field as to quality of coal, labor, and transportation. This insures only such revisions in price as will tend toward an efficient use of the available mine labor in the production of those grades of coal most in demand at points where it can readily be transported to consumers. The quality of the coal produced or the location of a coal field or even of a single mine where costs are exceptionally high may justify granting a special price.

HOW MAXIMUM RETAIL PRICES ARE ESTABLISHED

To supplement the prices of coal at the mines, the United States Fuel Administration has issued regulations governing the maximum retail gross margins that may be charged by retail coal dealers. The local fuel committee for each community ascertains, after a careful investigation of the retailer's cost of conducting his business, what it considers to be the proper maximum retail gross margin for the community.

The facts and data ascertained by this investigation along with the local committee's recommendations are forwarded to the State Fuel Administrator, and he then establishes the maximum retail gross margin for that community. The maximum retail price of coal in that community is then determined by adding this maximum retail gross margin to the price of coal at the mine and to the transportation charges.

The chief service rendered by the establishment of maximum retail prices has been the prevention of a run-away market or price panic, which would inevitably result in the absence of regulation and from an insufficient supply.

THE PRACTICAL PROBLEM OF COAL USERS TO-DAY IS TO MAKE EIGHT OR NINE TONS OF COAL TAKE THE PLACE OF TEN.

CURTAILMENT OF NON-WAR INDUSTRIES

Soon after the establishment of the United States Fuel Administration it became evident that the continuation of the war would make it necessary to curtail the amount of fuel being consumed by industries the operation of which is not directly essential to the successful conduct of hostilities. Such serious action, however, required caution. Investigation showed that about twenty billions of dollars are invested and ten million men employed by industries of this class. If they were curtailed fifty per cent., five million families would lose their means of livelihood and severe hardship, if not widespread panic, would result.

While some employees of the lesser-essential or non-war industries might find work in munition plants, the larger proportion were not trained or adapted for such service. It was realized that keeping labor employed is necessary to keep the country in healthy condition for the successful waging of war. The program was, therefore, formulated of curtailing these industries gradually, and to make the curtailment conform as nearly as possible to the growth of our new war machine.

As regards some of the non-war industries, other executive departments of the Government are much more directly affected than the Fuel Administration, in that the consumption of coal by many of such plants is comparatively small, but their requirements are large in numerous lines such as steel and other products needed in the war industries.

Numerous manufacturers have been moved by patriotic sentiment to offer curtailment of production and through such offers conferences have been brought about which have resulted in voluntary agreements to reduce the use of fuel and other war essentials by substantial percentages.

Half Fuel Ration for Beer Making

After consultation with the Chairman of the War Industries Board it was decided on July 3, 1918, by the Fuel Administration, to restrict the consumption of fuel among industries engaged in the production of alcoholic or non-alcoholic beer, ale, porter, or other cereal beverages, during the year beginning July 1, 1918, and ending June 30, 1919, to an amount not in excess of 50% of the average annual amount of the fuel consumed during the period from January 1, 1915, to December 31, 1917.

In cases where such an industry was not in existence on January 1, 1915, the period during which it has been in existence prior to January 1, 1918, shall be considered and used as a basis in determining the quantity of fuel that may be consumed.

Two or more plants, under the same or separate ownership may combine such plants and use the fuel allotted to each by this regulation, provided the total amount of fuel so used shall not be in excess of the amount of fuel permitted to be used by all when operated separately.

During the period from April 1, 1918, to June 30, 1918, a voluntary cut of thirty per cent. (30) of the amount of beer brewed during the corresponding period of 1917 had been observed through the cooperation of The War Service Committee of the United States Brewers' Association.

STATEMENT OF JULY 10, 1918

On July 10th the Fuel Administration issued the following statement dealing with the brewing industry:

> Referring to the order of July 3rd cutting down fuel going to breweries, Mr. Garfield states that in view of the present coal, transportation and other shortages and until the prospect of larger service is assured, breweries will not be able to count upon a supply of coal beyond that needed to utilize the materials in the process of manufacture, including malt already manufactured.
>
> This is merely another step in the program of curtailment of non-war industries begun several months ago, and is necessary in order that coal may be immediately delivered to war industries and to sections of the country remote from the mines.
>
> At the present time, for example, the railroads report that 200 more cars can be daily passed through the New England gateways provided the coal can be furnished. It is imperative that advantages be taken of this opportunity, because two-thirds of New England's coal supply goes in by water and after winter sets in shipments are greatly reduced. Moreover, the delivery of the New England allotment by water is seriously behind schedule, but coal for 200 additional cars can be had only by diverting it from other industries, and obviously it should be taken from non-war industries.
>
> Before issuing the order of July 3rd, the Fuel Administrator conferred with a special committee appointed by the President, composed of Mr. Baruch, Mr. Hoover, Mr. McCormick and Mr. Garfield, to consider the reduction of activities in non-war industries to save the consumption of raw materials, food, labor and transportation, and that order had their approval.
>
> This Committee has recommended the appointment of a special committee, composed of Messrs. Clarence M. Woolley, Edward Chambers, P. B. Noyes, Theodore F. Whitmarsh and Edwin B. Parker, of the Priorities Board, and Prof. Edwin F. Gay, statistician, to study each industry with a view to ascertaining what curtailment can be made, and to report to the Priorities Board from time to time, the Priorities Board in turn advising the various administrative departments to take such action as will effectuate its recommendation.

Manufacture of Clay Products Restricted

In April, 1918, the Fuel Administration issued regulations, approved by the War Industries Board, restricting the manufacture of clay products and rearranging and dividing the manufacturing program in such a way as to place this industry on a war basis. The products dealt with were arranged in classes, and manufacture curtailed on a percentage basis, as follows: Face Brick, Common Brick, Paving Brick, Terra Cotta, Roofing Tile, Floor and Wall Tile and Sanitary Ware, each 50 per cent. restriction; Hollow Tile and Drain Tile and Sewer Pipe, each 25 per cent.; and, Stoneware (except chemical), 15 per cent.

A modification effective June 19, in relation to the manufacture of sanitary ware, granted permission to use fuel in excess of 50 per cent. of the previous year's requirements upon individual application to the Fuel Administration, proof being submitted that the increased production is necessary to meet war-time needs.

An accompanying order permitted the use of wood and peat, when not transported by railroad, in the manufacture of all clay products and sanitary ware in excess of the quantity of fuel permitted by the

April order. All such users, however, must at once notify State Fuel Administrators of their respective States in writing of the exact time when they began the use of such wood and peat.

Fuel Administrator Garfield issued an order in April, 1918, reducing the fuel used in the production of enameled ware 50 per cent.

Less Fuel for Pleasure Automobiles

Fuel Administrator Garfield on June 12, 1918, stated, in regard to the curtailment of fuel for the manufacture of pleasure automobiles, that the general question was in the hands of the Steel Section of the War Industries Board. The Fuel Administrator felt responsible, he said, to limit the amount of fuel used in the manufacture of pleasure automobiles to whatever extent the national situation demanded. He made it plain that even if steel is available for a larger production, he would be compelled to limit the fuel for the manufacture of pleasure automobiles in the season 1918-1919 to not over 25 per cent. of that consumed for this purpose in the season 1917-1918.

This curtailment does not affect the manufacture of trucks or other cars for war use, nor the enormous amount of other war material which the automobile companies have already undertaken for the Government.

No Fuel Allowed to Private Yachts

Restrictions of the use of coal and fuel oil on private pleasure yachts was announced by the Fuel Administration on May 29, 1918, after consultation with the Chairman of the War Industries Board. It was ordered that during the period from June 1, 1918, to May 31, 1919, no coal or fuel should be consumed, burned, used on, or furnished to a private yacht for any purpose whatsoever except for galley fuel. It was provided that the order should not be construed to regulate the use of fuel by any craft in the service of the Government; and any private yacht which on the first day of June, 1918, was away from its home port was allowed to use fuel to reach its home port, by the shortest practicable route.

Fifty Per Cent. Cut for Florists

Following several conferences with florists, it was agreed that a 50 per cent. curtailment in fuel, which, in general, means a curtailment of hot-house space, would permit the florists to preserve their most valued stock and keep their business organizations intact during the war. A regulation to this effect was, therefore, issued by the Fuel Administration governing the use of fuel by florists, during the year beginning April 1, 1918, and ending March 31, 1919.

The order applies to any person, firm, association, or corporation, engaged in the growing of flowers, plants or winter vegetables, but does not include greenhouses devoted exclusively to the growing of plants for transplantation to produce summer vegetables. The curtailment of 50 per cent. is based on the amount consumed by each greenhouse during the period from April 1, 1915, to April 1, 1918. In case any particular greenhouse was not in existence on April 1, 1915, the period during which it was in existence prior to April 1, 1918, is used as a basis. Two or more greenhouses under the same or separate ownership may combine and use the fuel allotted to each, provided the amount so used shall not be in excess of one-half of the fuel consumed by all of such greenhouses when operated separately. A modification, effective June 19, permits the use of wood or peat, when not transported by railroad, in excess of the fifty per cent. fuel allowance; provided, the user at once notifies his State Fuel Administrator of the beginning of the use of wood or peat.

Economy Observed by Glass Makers

An order of the Fuel Administration issued in February, 1918, limited the use of coal in the production of common window glass to 50 per cent. of the amount manufactured in 1917.

Representatives of the Automatic Machine Bottle Manufacturers' Association voluntarily agreed with the United States Fuel Administration in April, 1918, to curtail their total output 15 per cent.

Saving Fuel in Making Ice

The ice and refrigerating industry of the eastern section of the country was represented on June 6, at a conference with P. B. Noyes, director of conservation, United States Fuel Administration. The purpose of this meeting was to lay plans whereby the Fuel Administration, in cooperation with the Food Administration, might lend active assistance in the adoption of recognized methods of conservation. It was agreed that no measure should be adopted which would restrict the ice output.

Musical Instrument Curtailment

The Fuel Administration and representatives of the musical-instrument industry reached an agreement in April, 1918, curtailing the output of the industry thirty per cent. during April, May and June. These manufacturers arranged with the War Industries Board for the transfer of war work to the musical-instrument factories wherever possible.

Representatives of the talking-machine manufactories have tentatively agreed to a curtailment amounting to 50 per cent. of the machines and 30 per cent. of the records heretofore produced annually.

Fuel to Country Clubs Restricted

The Fuel Administration on July 13 issued an order restricting fuel consumption by private country clubs. During the period from December 1, 1918, to April 1, 1919, these clubs are not permitted to use fuel of any description, including coal, coke or natural gas, fuel oil or other petroleum products, or use power derived from any such fuel except that wood or peat may be used if available without the use of railroad transportation. Permits to use fuel other than wood or peat may be granted upon receipt of a certificate from the Fuel Administrator for the State within which the club applying therefor is located, that the fuel can be spared and that it is not against public interest to grant such permit.

"LIGHTLESS NIGHTS" ORDERS

"Lightless Nights" were inaugurated by the Fuel Administration, November 15, 1917, for the purpose of conserving the fuel supply of the nation. On December 14, lightless nights were restricted to Sundays and Thursdays. Sunday, December 16, 1917, was the first day on which this order became effective. On April 22, 1918, this order was temporarily suspended.

On July 20, 1918, a new order was issued, effective July 24, in which it was stipulated that the use of light produced by the use of coal, gas, oil or other fuel for illuminating or displaying advertisements, announcements or signs, or for the external ornamentation of any building would be discontinued entirely on Monday, Tuesday, Wednesday and Thursday of each week within New England and the States of New York, Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia; and, on Monday and Tuesday of each week in all the remainder of the United States. The order excepted bona-fide roof gardens and outdoor restaurants and outdoor moving picture theatres.

Street illumination in all cities was restricted to the hours between sunset and sunrise, and the amount of public lighting in any city reduced to that necessary for safety. The order charged local Fuel Administration officials with the duty of arranging with municipal authorities for the regulation of public lighting, in accordance with the provisions of the order.

The use of light for illumination or display in shop windows, store windows or in signs in show windows was discontinued from sunrise to sunset, and discontinued entirely on the "Lightless Nights" designated by the order.

The Bureau of Standards of the Department of Commerce has estimated that about 500,000 tons of coal per year is used for advertising purposes, including display and show window lighting in the United States. Similar estimates fix the amount of coal used in advertising lighting in New York City at 16,000 tons per year.

TWO KINDS OF COKE AND STATISTICS THEREON

The effect of the war on the coke industry has been to tremendously increase the output of by-product plants. Most of our coke was heretofore made in beehive ovens at or near the mines. Before the end of the present year the production of by-product coke will exceed the production in beehive ovens, as the war has greatly stimulated the substitution of by-product ovens for beehive.

Beehive coke is the product remaining from bituminous coal after partial combustion, in which the volatile matter is consumed, leaving the fixed carbon with the ash originally contained in the coal. Until a comparatively recent period beehive coke was the standard fuel for blast furnaces and foundries. It is now gradually being replaced for such uses by coke made in by-product ovens, but at this writing still constitutes nearly 60 per cent. of the metallurgical coke produced in the United States.

By-product coke is manufactured in ovens of the retort type by a process of distillation or carbonization of bituminous coal. This method of manufacturing coke recovers the volatile matter which is burned in the beehive ovens. The yield of coke per ton of coal is somewhat higher than in beehive ovens, and there is a considerable quantity of surplus gas available for fuel; thus the substitution of by-product ovens for beehive ovens results in a direct saving of more than ten per cent. of the quantity of coal used. In addition to the surplus gas, light oil, ammonia and tar are recovered. Light oil and ammonia are used in the manufacture of explosives.

The production of beehive coke at the present time is limited by the lack of sufficient labor at the mines and at the ovens. The country's requirements for coke exceed the current production by about 100,000 tons per week. That is to say, a full supply of coke to all war industries and to gas works to replace anthracite coal in districts to which it is difficult to transport anthracite would require this tonnage. The market for coke would absorb a much greater tonnage.

During January and February, 1918, the production of coke was interfered with seriously by the bad weather which prevented regular movements of the product from the beehive ovens and of coal to by-product ovens. Late in February the statistics began to reflect the better transportation conditions. The production for the first three months of 1918, and by weeks during April, May and June, was as follows:

	By-product Coke		Beehive Coke	
	Net tons	% Capacity	Net tons	Total
January, February and March	5,176,742	78.0	7,298,167	12,474,909
Week ended—				
April 6	466,223	87.5	621,000	1,087,223
April 13	469,561	87.9	672,000	1,141,561
April 20	470,916	88.0	614.000	1,084,916
April 27	475,979	89.1	652,000	1,127,979
May 4	479,138	89.6	647,000	1,126,138
May 11	485,042	89.2	668,000	1,153,042
May 18	484,688	89.2	678,000	1,162,688
May 25	484,402	88.5	663,000	1,147,402
June 1	479,824	87.7	612,000	1,091,824
June 8	481,997	88.1	636,000	1,117,997
June 15	484,290	88.4	661.000	1,145,290
June 22	489,239	89.4	610,000	1,099,239
June 29	496,396	90.5	604,000	1,100,396
Total	11,424,437	83.35	15,636,167	27,060,604

In 1917 the coke produced in by-product ovens was 22,439,280 net tons and the beehive coke produced was about 33,160,000 net tons, according to current estimates; a total of 55,599,280 tons.

In 1916 the figures were 19,069,361 tons for by-product and 35,464,680 tons for beehive; a total of 54,534,041 tons.

Terre Haute, Ind., schools saved fuel in January, 1918, by shortening the school day. Recess periods were cut out and the noon period cut down so that school could be let out earlier in the day.

HOW TO RUN HOUSEHOLD HEATERS

How to get more heat out of your coal than the chimney does, is more important than any other branch of household economy. In the average home 25 per cent. of the coal used can be saved. Most of this saving can be accomplished by PROPER DAMPER CONTROL. G. L. Larson, of the University of Wisconsin, an an interesting pamphlet on fuel conservation, places the possible percentage of saving much higher. He says:

> Tests have shown that from 40 to 50 per cent., on the average, of the heating value of the coal is usefully employed in heating a house or a building. Under conditions of proper installation and frequent and careful attention, 50 to 60 per cent. of the heating value may be converted into useful heat, while under unfavorable conditions only 25 per cent., or even less, of the heat value of the coal is utilized.

There is no more important general rule than the one emphasized by L. P. Breckinridge, of the Sheffield Scientific School of Yale University, to this effect:

> The flow of air through the fuel makes it burn. Learn to control it. Try to visualize this flow of air through the fuel and you will easily learn how to operate the dampers to control it properly. . . . The draft of the chimney is much diminished when by opening the check-damper cold air is allowed to flow directly into the chimney.

Save, to Help Win the War

This year the war requires at least eighty million more tons of coal than were taken from the earth last year. Mine operators and miners are speeding their work but cannot supply all the extra tons needed. There is a limit to production because there is a limit to labor and to transportation. Many million tons of the added war requirements must be saved in the homes, apartment houses, hotels, churches, schools and stores. American householders must answer the coal challenge.

Many householders will say that they can save no more fuel; that they used last year, the least possible amount to keep their families in health and comfort. The United States Fuel Administration states that it can make a family *more* comfortable with *less* fuel, if the head of the house will operate his heater and range properly.

The Fuel Administration's first charge to the householder is cleanliness. To get the most heat from the least amount of coal his heater must be CLEAN. One one-hundredth inch of soot has the same power to resist heat as ten inches of iron. The soldier in the trenches endures filth that he may cleanse the world of German bestiality. The American householder will turn chimney sweep, unpleasant though his task may be, that he too may know the glory of serving against the Hun.

The Fuel Administration asks the head of each household to CARE FOR HIS HEATER HIMSELF this winter; to learn how to run his heater intelligently; how to get from every ton of coal every unit of heat it can supply to his family.

Give your heater its first cleaning of the season in the late summer and have it put in thorough repair. Broken parts mean loss of heat. The fire-box should be tight. Trivial cracks may be cemented.

If the landlord refuses to make adequate repairs the householder should report the matter promptly to his local or State Fuel Administrator.

Following are fuel savers and comfort suggestions, assembled briefly in the form of practical rules for operating the various types of household heating systems:

GENERAL RULES, OR, HIGH POINTS IN MANAGEMENT

Applicable Alike to Hot-Air Furnaces, Steam and Hot-Water Plants and Kitchen Ranges

1. Be sure there is a CHECK DRAFT-DAMPER IN THE SMOKE-PIPE, besides the turn-damper. This check draft-damper is as important in controlling the rate at which the fire burns as is the throttle of an engine. Open it to check the fire. Close it to make the fire burn more rapidly. Experiment with it in the daily regulation of your fire. Make it do its work. The coaling-door was not put on the heater to check the draft. If you cannot check the fire without opening the coaling-door, you need proper dampers.
2. The turn-damper should fit the smoke-pipe loosely and must never be entirely closed. With the average plant it may be kept partly closed most of the time in mild weather, but during severe weather it usually needs to be opened wide.
3. Make use of the lift or slide-damper in the coaling-door ONLY TO LET OXYGEN IN TO CONSUME GASES, if you are using soft or bituminous coal after fresh fuel has been added.
4. Just enough draft and that from below, checking the draft by LETTING MORE AIR INTO THE SMOKE-PIPE, is one of the best general rules. This furnishes oxygen from below, necessary for the consumption of the coal-gases, and at the same time gives time for them to be consumed before being drawn up the chimney. This method also avoids escape of coal-gas into the cellar. To make the fire burn more rapidly, do not open the whole ash-pit door, but only the draft-damper in the ash-pit door. Opening the whole ash-pit supplies air to the fire faster than it is needed for combustion. The air is heated, passes out the chimney and is so much heat wasted.
5. All heat pipes in the cellar should be thoroughly and completely wrapped with asbestos or similar covering to prevent loss of radiation.
6. Grates should be cared for properly. A short, quick stroke of the shaker handle will sift the ashes through the grates. Leave grates in flat position when through shaking. Clean ash-pit daily, to prevent damage to grates. In severe weather grates should be shaken until a glow appears in ash-pit. In moderate weather a bed of ashes should be carried on top of the grates.
7. Avoid poking and slicing fire-bed. It causes draft holes and clinkers.
8. Never shake a fire that is low until you have put on a little fresh coal and given it time to ignite. A thin fire wastes coal. Disturb the fire as little as possible.
9. Storm-windows and storm-doors, weather-strips and such protective devices are economical of heat.

10. Keep the temperature of sitting-rooms at sixty-eight degrees or less. If there are invalids, old folk or very little children in the family, the temperature may be higher. Rooms where you do not sit are more comfortable if much cooler, as a rule, providing the air is kept a little moist. Get a thermometer—a good one. Use it inside, not hanging outdoors.

11. It is wasteful to allow the temperature to drop way down at night. It takes twice as much coal to heat it up again next morning.

12. Turn off the heat in unused rooms whenever possible. Bedrooms should be kept much cooler than living rooms. Don't try to heat all the rooms all the time. If you have a hot-water system, make heavy radiator slip-covers and put them over radiators when not in use. This will prevent freezing.

13. Always keep two pans or open-top jars of fresh water on radiators or in front of registers to keep the air in the home moist.

14. Study the Specific Rules applying to the system of heating in your house.

HOT-AIR FURNACES—SPECIFIC RULES

1. Provide cold-air drops from upper floors so as to *insure a return circulation* from all rooms *to the air intake* of the furnace.
2. Regulate the window of the cold-air box so as to avoid too great a current of outside air, especially on very cold days.
3. Always keep the water container in the air-jacket filled with clean water. Moist air heats much more readily than dry air, and is better for health, as well as more comfortable.
4. It is advisable to keep a jar of water near one of the first-floor registers that sends out the most heat. Change the water frequently, preferably every day.
5. Hot-air pipes should have a good pitch upward from the furnace, and should be of sufficient diameter. They should also be wrapped with sheet asbestos. A separate pipe for each room with a turn damper near the furnace is a good rule. Each pipe should be labeled, so that certain rooms can be shut off at the furnace when desired.
6. Be sure the fire-box is gas-tight. All cracks must be thoroughly cemented or a new section put in before winter sets in. Otherwise coal-gas will escape into the air-jacket and be carried up directly to the rooms.
7. Study carefully the General Rules pertaining to other types of heating-plants as well as your own. Notice the "clean-out" door and remember why it is there.

STEAM HEATERS—SPECIFIC RULES

1. The water in the boiler should be completely changed at least as often as every spring and every autumn. Draw a bucketful of dirty water from the bottom at least twice a week and each time replenish with fresh water from the supply-pipe. Cleanliness of water in the boiler is of prime importance.
2. Look at the glass water-gauge whenever you attend to the fire.

Turn the exhaust-cocks above and below the gauge occasionally to make sure that it is not clogged or the openings to it from the boiler closed up. They must be kept open.

3. The level of the top of the water must always show at some point along the gauge. Its height will vary with the temperature of the water; but if it rises above the top of the glass there is too much water in the boiler and some must be drawn off; and if it sinks below the bottom of the glass some more water must be let into the boiler.
4. Be sure that the exhaust-valve of each radiator works. Sometimes these valves need cleaning with a pin or soaking in kerosene. If in doubt about one of them unscrew it from the radiator when the fire is low and there is no steam-pressure, or else after turning off the radiator. If you can blow through it, it is all right. If not it must be cleaned until you can. Don't fail to replace it. It is advisable to have an extra valve to replace any one that is temporarily out of order.
5. Don't fail to study the General Rules, applicable to all heating-plants, and also to keep the boiler-flues clean.

HOT-WATER PLANTS—SPECIFIC RULES

1. All the water should be emptied from the plant and clean water put in at least as often as every spring and every autumn.
2. When the first fire of the season is built, as the water gets heated, take the radiator key and open up the exhaust-valve of each radiator in turn until all the air remaining in each radiator is allowed to escape. Repeat this operation occasionally to make sure there is no air interfering with free circulation of the water.
3. Always be sure that water shows in the glass gauge of the exhaust tank, which is usually located in the top story of the house above the level of all radiators.
4. Be sure the boiler is covered with asbestos, as well as the pipes in the cellar.
5. Study carefully the General Rules relating to all types of plants. Keep heating surfaces of the boiler well cleaned.

THE KITCHEN RANGE

1. Avoid too much shaking. Live coals in the ash-pit mean wasted fuel. Clean ash-pit daily to prevent damage to grates.
2. Clean the entire stove well inside, on top of the oven and below the oven, frequently and thoroughly.
3. Stoke frequently and in small amounts.
4. Never shake a low fire until a little fresh coal has been added and given time to ignite.
5. Keep a pan or kettle of water always on the kitchen stove. Moist air makes for comfort, health, beauty and economy.
6. Read the General Rules applying to all household coal-burners.

FUEL ECONOMY AT HOME WILL WARM A SHIVERING BOY IN FRANCE.

ADVANTAGE OF MOIST AIR IN ROOMS

As humidity of the atmosphere controls the distribution of the sun's warmth upon the earth, so does moisture in the air of the home have a controlling influence upon its comfort. If the air in a room is dry, the heat from stove, register or radiator, strikes through this dry air readily, and, without being absorbed, rises quickly to the ceiling; while if the air is moist the heat is absorbed and the general temperature of the atmosphere of the room is perceptibly raised.

Clouds have a cooling effect on a hot day because they are masses of moisture, absorbing heat from the sun's rays before it reaches the earth.

While a damp climate is enervating in hot weather and biting in cold weather, nevertheless, a moderately moist atmosphere in the temperate warmth of the living rooms adds to comfort and works for economy and health. The air of heated rooms is nearly always too dry.

In dry air the evaporation from skin, throat and lungs is increased; illustration of this is the fact that woodwork and furniture usually swell when exposed to the natural summer atmosphere, while they shrink and crack in heated rooms in winter.

It is advisable to keep a bowl or open jar or two of fresh water in each heated room, giving the air a chance to absorb moisture from them rather than from your body and the furniture.

PHYSICIANS ADVOCATE COOLER HOMES

Endorsement of the contention that the atmosphere of the home is most often too hot and too dry has been given by eminent physicians of the country. Dr. James J. Walsh, physician, doctor of philosophy and author, says this:

> Pneumonia takes a little more than one man in eight, and therefore has wrested from tuberculosis the grim honor of killing the most human beings. Man is a marine animal, seven-eighths water. He needs cool air and moisture around him. Overheated dry air makes him too susceptible to disease. In a temperature of over 68 degrees it is difficult for men and women to exist healthfully. If Americans can be taught to live in this temperature the number of pneumonia victims will surely decrease. Fresh, cool, moist air is the foe of pneumonia, and persons who keep their houses cool and breathe fresh, moist air need have no fear of it.

Dr. Abraham Jacobi also gives his endorsement in the following words:

> Seventy degrees is too much; 65 is ample for persons in robust health who are actively engaged. Susceptibility to disease is developed by breathing an overheated atmosphere, and if persons can be taught to keep their houses cool enough for health, life as well as coal will be saved.

Dr. Haven Emerson, Commissioner of Health of New York, is another distinguished physician who advocates a reasonable temperature in American households. He says:

> A temperature of 68 degrees supplies ample heat for all healthy persons. There is no question that our houses and offices are kept too warm. An undoubted improvement in the public health will take place if the American people can be persuaded to keep their houses cool enough.

LICENSES FOR COAL JOBBERS

The United States Fuel Administration, in March, 1918, decided to provide coal jobbers with licenses, authorizing them to operate This regulation became necessary when it was discovered that various abuses had sprung up which rendered a closer regulation of the business advisable. Among these abuses was the organization of affiliated companies solely for the purpose of collecting the jobbers' margin, the "swapping of coal," and other fictitious trade operations, which increased the cost of coal to the consumer. The Fuel Administration disclaimed any intention of eliminating the legitimate jobbers, but on the contrary recognized their importance to the trade.

Accordingly, upon the recommendation of the Fuel Administration, the President issued a proclamation providing for the licensing of jobbers. Regulations carrying out the order were at once adopted. Under these regulations the licensee may purchase and resell coal for his own account. When he acts in this capacity he may not sell at any price in excess of the Government mine price.

On the other hand, performing his function of rendering service to the consumer or retail dealer in procuring coal, he may, when he has been authorized by the dealer or consumer, buy for them at any price not in excess of the Government mine price; and those who choose to employ him for this purpose may compensate him by paying him a purchasing commission, not to exceed in any case the reasonable limit fixed in the regulations as the maximum compensation for that service. In this transaction he may not make any profit, directly or indirectly, other than his purchasing commission. These commissions are, briefly: Fifteen cents on bituminous, 20 cents on anthracite coal in the East and 30 cents in the West, and 5 per cent. of the delivered price on smithing coal.

Anthracite Moving Well to New England

The aim of the Fuel Administration to accomplish the movement of two-thirds of the annual anthracite allotment to New England before the winter season was being steadily realized according to the situation in July. For the months of April, May and June shipments into New England amounted to approximately three and a quarter million gross tons. The total allotment to New England for the year was 10,331,000 gross tons.

The object was to effect the transportation of the bulk of this through the narrow railroad gateways, during the open season. New York City received during April, May and June slightly more than its allotment for the three months.

Coal Supply Cut Off From Neglectful Dealers

Carrying out a warning conveyed by telegrams to 750 coal dealers in New England that if they did not file the weekly reports required of them by July 10, their supply of coal would be cut off, letters were forwarded by Fuel Administrator Garfield on July 18, 1918, to State Fuel Administrators, instructing them to request railroad agents in each town in their respective states to divert coal moving to dealers who have failed to report, reconsigning all coal to dealers in the same town who had reported. Those who had not reported included 3 dealers in Connecticut, 3 in New Hampshire, 2 in Vermont, 5 in Rhode Island, 20 in Massachusetts, 37 in Maine.

DAYLIGHT SAVING, HERE AND ABROAD

Daylight saving, from Sunday, March 31, to Sunday, October 27, 1918, was established by Congress in March, 1918, as an effective method of conserving the health, the wealth, and the mineral resources of the nation. All clocks in the country were moved forward one hour, at 2 A. M., March 31.

The adoption of the plan by the United States is attributable to its successful operation in Great Britain, France, Italy, Germany, Austria, Holland, Denmark, Sweden, Norway, Portugal, Australia, and Iceland.

It was estimated that Great Britain in which the plan is in force only during four and one-half months each year saved in 1916, approximately 260,000 tons of coal, and 11,600 tons of fuel oil. In France, where the plan was in operation only three and one-half months, the saving in coal that year aggregated approximately 250,000 tons.

Estimates of the saving in coal that will be effected in 1918 in the United States under the present daylight saving plan vary from 1,000,000 tons to 1,500,000 tons.

The amount of coal used in this country during the summer months in the generation of heat and light is insignificant, however, when compared with the amount consumed during the other seasons of the year.

Great Britain and Northern European countries have restricted the use of the daylight-saving plan to the summer months because the hours of daylight during the remainder of the year are so few as to render the plan impracticable.

Practically all of Europe lies north of the average latitude of the United States, and the northern boundary of this country is farther south than the greater portion of Europe. In every portion of the United States there are much more than eight hours of daylight on even the shortest day of the year. Daylight saving, therefore, would be practicable continuously in this country, and the saving effected would be very much greater in the winter than in the summer.

Two changes of time each year will subject the railroads, and every other common carrier, to an inconvenience which would be obviated by the permanent adoption of the present standard of time.

The difference in time between Washington and London would be shortened one hour by the permanent adoption of the daylight saving plan, by the United States, an item of importance in facilitating commercial intercourse between the United States and the Allies.

OPERATION OF THE "HEATLESS DAYS" ORDER

Unprecedented adverse weather conditions and inadequacy of coal supply and transportation facilities to meet the enormous war-time demand, made it necessary to enforce restrictive measures in January, 1918, east of the Mississippi River. The movement of coal in transportation was so directed as to aid the Director-General of Railways in dealing with the railroad emergency created by blizzard conditions. The United States Fuel Administration proclaimed what became widely known as "Heatless Days."

It was ordered that on January 18, 19, 20, 21 and 22, preference and priority in the use of coal be given only to those whose consumption of coal was absolutely necessary. These included in order: Railroads, domestic consumers, hospitals and charitable institutions, public utilities, ships at tidewater for bunker purposes, United States Government use, municipal or county governments for necessary public use, manufacturers of perishable food or food for immediate consumption. In addition all use of fuel, except by consumers classed as absolutely necessary was prohibited on Monday of each week from January 21 to March 25.

At the time there were 250 ships laden with war materials unable to move for want of coal, also tens of thousands of tons of such materials waiting to be loaded on ships and transported to France. The day following the five-day curtailment period found every ship of the 250 under steam and at sea. In addition many other ships arrived, were bunkered and made their departure. Towns and cities that would have been without fuel were afforded a supply. Coal was on hand at bunkering points in quantity. Figures submitted by transportation companies showed a marked improvement in conditions. The only hindrance to a perfect operation of the coal movement was the extraordinary cold weather in the mountain sections, through which all coal for eastern use must pass.

After the third "Heatless Monday," which was February 11, 1918, such favorable results had been obtained that the Fuel Administrator suspended the general curtailment order. There had been just eight days of enforcement. Provision was made whereby any State Administrator might, if considered necessary, continue the operation of the original order. The "Heatless Monday" order was continued in force only in New England and there for just one additional week.

"TAG DAY" CEREMONIES

President Wilson's two coal shovels were tagged, on the afternoon of January 30, 1918, in front of the Executive Building of the White House, thus setting the mark for "Tag Day" which was observed throughout the United States. Similar ceremonies took place in virtually all cities and school districts of the United States. Governors' and Mayors' shovels were tagged by the thousands.

These tags contained on one side the legend: "Save that Shovelful of Coal a Day for Uncle Sam." On the reverse side were printed "Hints on Saving Coal."

CONSERVE THE FUEL.

"SAVE THAT EXTRA SHOVELFUL;" THE TONS WILL TAKE CARE OF THEMSELVES.

HYDRO-ELECTRIC POWER DEVELOPMENT

A general development of facilities for the generation of electric energy by water power and the substitution of such energy for that derived from steam wherever practicable is strongly urged by eminent engineers. It is axiomatic that the utilization of the water powers of the country conserves just that much fuel which would otherwise be consumed in producing the energy required.

One of the most striking illustrations of the saving in coal effected by the installation of hydro-electric plants is contained in a statement by coal men that the annual consumption of coal in St. Louis was reduced by that means between 1,000,000 and 1,500,000 tons.

Western States have gone much further than those of the East in the development of their water powers. Large amounts of power can be developed in the West at a cost which compares more favorably with steam power than is the case in the East.

The superiority of electric over steam locomotives under certain conditions has been demonstrated in a number of cases, particularly on the Chicago, Milwaukee & St. Paul Railway and on the Norfolk & Western Railway. On what is known as the "Elkhorn Grade" on the latter road, which is now electrified, two electric locomotives haul at the rate of 14 miles an hour a freight train which formerly three of the most powerful steam locomotives were unable to haul at a speed not greater than 7 miles an hour.

The United States Geological Survey has estimated the potential water power of the United States under conditions of minimum and maximum flow, exclusive of the increase which could be brought about by the construction of reservoirs. Those estimates have been tabulated with reference to geographical sub-divisions of the country as follows:

Group of States	Estimated Minimum		Estimated Maximum	
	Horsepower	Per Cent	Horsepower	Per Cent
New England	868,000	3.11	1,605,000	2.98
Middle Atlantic	1,357,000	4.86	2,488,000	4.62
East North Central	832,000	2.98	1,604,000	2.98
West North Central	902,000	3.23	1,956,000	3.63
South Atlantic	2,346,000	8.39	4,257,000	7.96
East South Central	1,087,000	3.89	1,964,000	3.64
West South Central	353,000	1.26	822,000	1.52
Mountain	8,694,000	31.11	16,131,000	29.92
Pacific	11,504,000	41.17	23,078,000	42.81
UNITED STATES	27,943,000	100.00	53,905,000	100.00

Only about 1/6 of the estimated minimum potential water power available in the United States is now being utilized. Of the remaining 5/6, a certain amount can be economically developed at this time provided various obstacles can be overcome, namely, legal difficulties, scarcity of the necessary capital, materials and labor due to war conditions; and provided a favorable market within reasonable transmission distance can be secured.

A nation-wide survey of developed and undeveloped water powers of the country is being carried on by the Fuel Administration in co-operation with the United States Geological Survey.

POWER USED IN THE UNITED STATES

Condensed table from "Electric Power Development in the United States," a report of January 17, 1916, by the Secretary of Agriculture to the Senate The figures are from the 1912 census, and all power is included except that used on steam railroads.

Kind of Power	Total No. of Horsepower in use	Pr.Ct. of Total	H. P. used in Manufactures	Pr.Ct. of Total	H. P. used in Public Utilities	Pr.Ct. of Total	H. P. used by Electric Rys.	Pr.Ct. of Total
Steam	24,339,819	80	16,233,733	53.3	4,946,532	16.3	3,169,554	10.4
Water	4,870,320	16	1,927,932	6.4	2,471,081	8.0	471,307	1.6
Gas and oil	1,238,107	4	1,102,882	3.5	111,035	.4	24,190	.1
Total primary power in use	30,448,246	100	19,254,547	63.2	7,528,648	24.7	3,665,051	12.1

During the same year (1912) the country produced 450,104,982 tons of bituminous coal and 84,361,598 tons of anthracite, of which about one-third or approximately 178,000,000 tons, was used in the development of industrial steam-power. Practically no coal is used in connection with the development of water-power or gas and oil-power.

Steam railroads the same year used about 125,000,000 tons and steamships about 10,000,000 tons, while in steam heating plants about 70,000,000 tons were used. About 70 per cent. of coal each year is used in peace times in steam making and the balance in hot-air and hot-water plants, cook stoves, the making of coke and gas and exportations.

COAL COMPANY'S LICENSE REVOKED

J. P. O'Connor, doing business as the Penn Fuel Company, New York City, was deprived of his license as a coal distributor by the Fuel Administration in June, 1918, and the Department of Justice was requested to make additional investigation and to take such action against O'Connor as the facts might warrant. Mr. O'Connor admitted that he had knowingly violated an order in which the kinds of coal permissable to be sold for ship bunkers were clearly and distinctly defined, but sought to justify his conduct on the ground that he considered the restriction imposed in the order, as to the grade of coal, constituted an unjust discrimination against the kind of coal sold by him.

Violators of Orders Prosecuted

Approximately 200 cases involving alleged violations of the orders of the United States Fuel Administration have been referred by the Administration to the Department of Justice for prosecution. A large number of offenders are jobbers who have made a profit in excess of that allowed by the Administration. Others are against operators who have charged more than the regulation prices. In every case the offender was given opportunity to refund his illegal profits before his case was turned over to the Department of Justice.

Violators of Rules Refund $100,000

The legal enforcement section of the Fuel Administration has general supervision of the enforcement of all orders, regulations and rulings. Through reports received from officials of the organization, and from the Federal Trade Commission, this section is kept informed of violations. It has caused violators to refund sums aggregating more than $100,000. It also refers cases to the Department of Justice.

INSPECTION OF ALL POWER-PLANTS

"Maximum production with minimum waste" is the object of a country-wide branch of work of the United States Fuel Administration, the management of which is under supervision of the Bureau of Conservation. Every power-plant in the country is inspected and receives a classified rating in accordance with its efficiency shown in conservation of coal. It is believed that this work should become a permanent service of the Government.

From twenty to fifty million tons of coal per year can be saved by correct operation of steam power-plants using their present equipment without the delay or expense involved in the installation of new or improved apparatus, and without any curtailment of production.

An administrative engineer, appointed in each State by the Fuel Administration, work under the supervision of the present Federal Fuel Administrator in the State. Responsibility of rating the plants falls upon the administratve engineer in each State; the rating to be based upon reports of inspectors who are not to express opinions, but collect definite information. The State Fuel Administrator may entirely or partially shut off the consumption of coal to any needlessly wasteful plant in his territory.

Ratings are based upon recorded answers to questions regarding operation of installed equipment. Each question has a value depending upon its relative importance to the other questions. The difficulty, delay and expense involved in the installation during wartime of improved equipment is fully recognized; but experience has proved that 10 to 20 per cent. of fuel now used in power-plants can be saved by improvements in operation alone.

In advance of the first inspection a questionnaire is sent to every power-plant in each district, with notice to the owner that within, say sixty days, his plant will be inspected personally, and the questionnaire is checked up by the inspector upon his visit. This action gives a reasonable time to any plant owner to improve operation and conform to recommendations before his plant is actually rated.

War Conservation of Power and Light

The general plan of the Fuel Administration for the conservation of light and power has been systematized under the following subdivisions:

Economy in utilization of power and light in factories.
Elimination of uneconomical, isolated plants.
Application of the skip-stop to railways and regulation of car-heating and lighting.
Utilization of excess water power and inter-connection of power systems.
Limiting production of power to the most efficient plants available.
Economy in the refrigerating and ice manufacturing industry.

A brief statement with respect to each of these subdivisions is given in this publication. The work is carried out through the cooperaton of the following:

First.—Organized force of engineers stationed with the Fuel Administration at Washington.
Second.—Engineering Department of the United States Geological Survey.
Third.—Power Division of the Council of National Defense.
Fourth.—A State Fuel Engineer attached to the office of the Federal State Administrator, to supervise activities in his state.
Fifth.—Public Service Commissions and State regulatory bodies.
Sixth.—Chambers of Commerce and similar business bodies.
Seventh.—Volunteer engineers throughout the country.

By the closing or consolidation of plants there will be rendered available skilled men who are needed in many war industries. Provisions have been made whereby men with such training are assisted in obtaining profitable work. The Council of National Defense is examining all communities where there is a surplus of power, having in mind the establishment of industries in such communities.

Efforts are being directed so as to best serve the interests of all with a minimum of inconvenience and cost and with the object of making the available coal supply go as far as possible.

The Administration believes it should not be necessary to resort to the issuing of orders for the adoption of these conservation measures, and therefore invites cooperation as well as suggestions.

Saving Power and Light in Factories

It has been found possible to effect a material saving in the amount of coal used for producing power and light in factories. Figures obtained from factories where the plan has been put into effect show a saving in power of from 11 to 34 per cent. by economies in lighting, rearrangement of machines and shafting, elevator service, rearrangement of shift, keeping rooms at an even temperature, wrapping steam-pipes, etc. These were effected without decreasing output and with practically no expenditure of money.

In each of these factories a power committee was established, selected from among the foremen, watchmen and other employees based on ability, alertness and geographical location on the property.

An executive committee is usually taken from the power committee and should include a company official as Factory Fuel Administrator, also the factory manager, master mechanic, superintendent, electrician, millwright and chief engineer.

The executive committee prepares report blanks for the various departments and provides talks on power economy to be given once a week. Typical illustrations are given of the possible wastes of power, including the use of unnecessary lights; use of lamps of too high candle-power; elimination of carbon lamps; elimination of arc lamps and substitution of nitrogen filled lamps; restriction of sunlight due to dirty windows; operation of motors when machinery is idle; excessive sparking, heating or erratic speed of motors; proper alignment of shafting; grouping of machines so as to operate motors or engines as nearly loaded as possible, and the staggerding of operations so as to maintain as flat a load curve as possible.

By study of the load curve very valuable results have been accomplished in Massachusetts. It has been found possible to shut down generating units hitherto in continuous operation to take care of peaks.

There is a shortage of power in all of the war industry centers; and this flattening of load curves is becoming a vital necessity from the standpoint of minimizing the demand on the central stations as well as to save fuel.

Common faults needing attention are: slipping belts, dry bearings, overheated and underheated parts of plant, excessive drafts due to lack of proper protection about doors, windows, elevator and stair areas; reduction of elevator service or application of the skip-stop to elevator service; testing out of power circuits for relationship of capacity to load carried and paralleling power circuits.

Elimination of Uneconomical Plants

Throughout the country there are approximately 30,000 local electric generating plants located in structures of various types, including manufacturing establishments, office buildings, hotels, apartments, institutions, hospitals, etc. In many of these buildings the electrical equipment forms the principal part of the entire plant, while in other cases, the electrical end represents but a small item.

Many local electric plants could not readily adopt service from the large central station, but there are large numbers that could easily connect with the large electrical systems at a resulting money, as well as fuel, saving. In many sections, particularly at war manufacturing centers, central station power is not available and the local plant could not, at least immediately, connect with the larger central system, although the change might be desired.

Due to these varying conditions it cannot be decided by a general rule which of these plants could economically use other sources of electrical supply, and it means that each plant must be considered alone. With this in view the United States Fuel Administration has sent a questionnaire to operators of local electric plants and the data thus obtained will facilitate the proper consideration of each case individually.

Letters from those who have recently changed to a central station supply indicate that the new method is entirely satisfactory. Furthermore, these letters indicate what other observations have shown, that is, a general fuel saving of from 20 to 60 per cent.

In territories where ample hydro-electric power is available there seems to be, on the face of it, very little excuse for the burning of fuel in any electric generating plant.

A workable plan of accomplishing immediate results by voluntary action is that adopted by the Rochester, N. Y., Railway and Light Company, who have sent to plants which they believe could readily adopt their service, a letter which clearly states the facts, including their use of fuel, their willingness to cooperate and suggesting that both do whatever is possible for at least the period of the war.

Skip-Stop System Effective

Great economy has been accomplished in the use of fuel throughout the country by the introduction of the skip-stop system on the electric railways of the various cities.

With the old plan of having cars stop on signal at any street corner, there are usually from 12 to 14 stopping points per mile. With the skip-stop system, properly applied, these are reduced to not more than 8 per mile in the business districts, 6 per mile in residence districts, or 4 per mile in the open country. With the number of stopping points decreased in this way, a saving of from 10% to 15% can ordinarily be effected in the power and hence in the fuel required, while at the same time the average speed of the cars is increased, without any increase in the maximum speed, and the service thus improved.

The present plan of the Fuel Administration is to secure the adoption of the system by voluntary cooperation between the railway companies and the various municipal authorities or state commissioners and to bring about this cooperation through the Federal Fuel Administrators for the several states.

Through the efforts already made the skip-stop system has been adopted, or is about to be put into effect, as a coal conservation measure in Detroit, Baltimore, Brooklyn, Newark, Washington, Cincinnati, Indianapolis, Columbus, Dayton, Toledo, Oakland, New Haven, Richmond, Memphis, Nashville and many other cities. The Connecticut company has reported a saving in fuel of 10 per cent. for its New Haven lines and reports indicate saving in the other places at rates varying from 3,600 tons per year in Columbus to 21,000 tons per year in Detroit.

Interconnection of Power Systems

A method of fuel conservation which promises a considerable amount of immediate relief, and at the same time opens up a field with almost limitless possibilities for future development, is the interconnection of the present power systems of the country, and the consequent utilization of considerable excess water power which is at present available.

In many parts of the country duplicate transmission systems exist, serving practically the same territory. An interconnection between these systems, for the mutual exchange of energy, would in many cases result in marked economies.

In other cases the lines of a power company which derives all, or nearly all, of its energy from water power may extend very close to the lines of another company which uses coal for the generation of power. Since no company is so fortunate as to be operating with a 100% load factor, there are necessarily times, during light load, when the water power company is forced to allow unproductive water to flow over its dam. At such a time a great saving in fuel would be effected were the two companies tied together and the load on the steam station transferred in part, or entirely, to the water power plant.

Numerous hydro-electric companies have for a long time been carrying out this idea within their own systems, where the bulk of their power is derived from water, and at the same time they maintain a steam reserve to carry their load during low water periods.

In some cases these system-interconnections would involve a considerable expenditure of both time and money. In a great many instances, however, very considerable savings can be effected with a minimum of delay and expense.

Duplication of Power Systems

The Fuel Administration has located, so far, nearly 500 instances throughout the country where there exists, in one form or another, a duplication of power production and supply. In other words, there are communities where two or more central stations are furnishing electrical energy with systems paralleling one another.

It has very often been found, that at little or no expense, paralleling systems can be connected and supplied from the most economical stations, or, possibly, an interchange of power can be effected.

In a town of not more than 1500 inhabitants the municipal plant was closed down and electrical energy obtained from the local utility at a fuel saving of 1,200 tons of coal per year. The same utility plans a similar change in a town a trifle larger, where their service is available that will result in a saving of about 2,000 tons of coal per year. These cases represent those of the smaller class, but assuming them to represent the average of the 500 situations located, it can be seen that the possible fuel saving is about 1,000,000 tons annually.

Further economy in this connection is that of utilizing, wherever possible, all available water power to the very fullest extent and where this is done a maximum fuel saving is obtained.

Economy in the Ice Manufacturing Industry

In cooperation with the Joint Commission on Refrigeration which was organized to assist the Government during the war, the Fuel Administration is introducing numerous proved economies in the operation of ice and refrigerating plants.

One plant that possesses merit is that of allotting a definite amount of coal to individual plants, depending upon the size and type of plant, such allowances being based upon a reduction of 10 to 15 per cent. of the average present fuel consumption. This makes it necessary to adopt many simple measures of economy that had been overlooked.

Another conservation method is to produce white, or opaque, ice at a fuel saving of 5 to 20 per cent. This is accomplished by eliminating the power that is usually used for producing a transparent product.

One plan, which saves considerable ammonia as well as fuel, was successfully applied last winter. It is that of operating during the winter season, only the most efficient plant, or plants, as the particular case requires, in communities where, during the summer season, all plants are required. This arrangement provides that the operating plant, or plants, will sell at wholesale rates to those manufacturers whose plants are temporarily closed down.

ORIGINAL AND PRESENT QUANTITY OF COAL IN UNITED STATES

Number of net tons of each grade in each of the various coal areas, within 3,000 feet of the surface, and the total exhaustion to date.

(Expressed in millions of tons, i. e., 000,000's omitted.)

Table prepared from estimates made by the United States Geological Survey.

PROVINCE	Anthracite and Semi-anthracite Million Tons	Semi-bituminous and Bituminous Million Tons	Sub-bituminous and Lignite Million Tons	Totals of all Grades Million Tons	Remaining Supply at end of 1914 Million Tons
EASTERN. (Penna., Atlantic Coast and Appalachian regions)	21,150	*48,637 †503,012	......	572,799	561,032
INTERIOR. (Mich., Ill., Ind., W. Ky., Iowa, Kans., Okla., Mo., Ark., & S. W. regions)..	400	*1,226 †528,273	......	529,899	527,874
GULF. (Mined only in Texas, but deposits extend north to Cairo, Ill., and east to Ala.)..	......	......	§23,090	23,090	23,074
NORTHERN GREAT PLAINS. From N. Dak. and Montana south to N. Mex., inc. Denver and Raton Mesa regions)...	......	†45,553	‡284,548 §964,424	1,294,525	1,294,180
ROCKY MOUNTAIN. (Includes Bighorn, Wind River, Hams Fork, Green River, Uinita, S. W. Utah and San Juan River regions)	503	†354,640	‡713,283	1,068,426	1,067,609
PACIFIC COAST. (Chief field is in Washington)..........	......	†11,439	‡53,459	64,899	64,785
Totals	22,053	*49,863 †1,442,916	‡1,051,290 §987,514	3,553,637	3,538,554

* Semi-bituminous. † Bituminous. ‡ Semi-bituminous. § Lignite.

NOTE: The total production to the end of 1914 was 10,357,700,000 tons which was assumed to mean an exhaustion of approximately 50 per cent. more, or 15,083,000,000 tons. The production since 1914 to the end of 1917 has been 1,775,000,000 tons, and adding for exhaustion, a total is reached of about 2,554 million tons to be deducted from the total of the last column of the foregoing table, leaving gross coal resources of the United States at the beginning of 1918 about 3,536,000,000,000 short or net tons, according to the best estimates available. Therefore, in the 111 years since 1807 that mining has been conducted, the exhaustion has been about half of one per cent.; but more than half of this has been in the last twelve years, and it has included the coal least expensivo to take out.

THE MUNITION PLANTS MUST HAVE THEIR FULL QUOTA OF COAL. "SAVE THAT EXTRA SHOVELFUL."

WOOD AS FUEL AND HOW TO USE IT

Wood of any kind can be utilized to best advantage in a dwelling or apartment-house heating-plant, or a cook-stove, by burning it in combination with coal. It is advisable to throw wood blocks onto the fire when the fire box is comparatively empty and cover them with coal.

Much coal consumption can be saved in this way without interfering with comfort, but it is well to give the fire more frequent attention than when burning coal alone. The check-damper in the smoke-pipe should also be kept open wider than when burning coal alone, as less chimney draft is needed.

When wood is used alone in a heater intended for coal it is recommended that the grate be partly covered with sheet iron or fire-brick to reduce the draft.

Once the idea of using wood instead of coal takes hold of the minds of people in any community as a constructive and valuable aid in winning the war, it has been found that help for the movement comes in many ways; usually bettering, rather than depleting the farms. The Department of Agriculture and the United States Fuel Administration have statistics showing that there is a vast quantity of dead wood in many sections of the country and that the supply of wood in many communities is sufficient for domestic purposes in those parts. This wood in many instances is destroyed as waste and its conservation would serve the patriotic purpose of conserving coal needed to win the war.

When the Fuel Administration was first organized the country was found to be facing a coal shortage, and the situation became more serious in aspect as time advanced. There was no thought that the shortage could be met by an increased supply of cordwood, but it was felt that a vigorous and nation-wide campaign for the use of wood for fuel would alleviate the situation to a considerable extent during the winter of 1917, and its full benefits would be reaped during the winter of 1918.

The cooperation of State Fuel Administrators was sought and most efficiently given. Even in those States having plenty of coal, as in Pennsylvania, it was pointed out that it was a patriotic service for the people to burn wood so that that much coal might be released for war uses.

There was much activity in the South looking toward an intensive campaign for the substitution of wood. Governor Brough, of Arkansas, called attention of the people to the practice of promiscuous burning of wood in clearing new ground and urged its use as firewood. The Federal Fuel Administration of North Carolina established municipal wood yards. The use of convict camps was adopted in some localities as means of collecting wood.

In practically every county of Tennessee War Fuel Companies were organized with marked success. In some counties there are two companies organized by patriotic local citizens, the capitalization of each company varying with the situation; the average capitalization being $1,500. Each local company has a manager who superintends the cutting and the selling of wood. When there is any higher profit than six per cent. the money is donated to the Red Cross. The wood, which is beech, scrub oak and ash, is obtained by thinning out the forests near the edges of towns, and by cutting on uncleared lands; thus enhancing the value of the lands.

In the substitution of wood for coal much-needed lessons are available from the examples of European cities, especially in Scandinavia, where wood fuel reserves are provided by the municipalities. In the public parks in Stockholm, Sweden, for instance, large stacks of fuel wood are piled up for use in any emergency.

Hickory, oak, beech, hard maple, birch, cherry, ash, longleaf pine, locust and such species have high fuel value in comparison with other woods. One cord of any of these when dry and seasoned weighs about 4,000 pounds and is the equal in fuel value to about one ton of coal, according to a bulletin on the subject issued by the United States Forest Service. Hickory is the best wood to use for a coal substitute. The oaks come next and are followed in order by beech, birch and maple.

COAL DISTRIBUTION WITHIN STATES

Plans for the distribution of coal within the individual states were formulated and put into operation in June, 1918, by the United States Fuel Administration. This plan defines the responsibility and authority vested in the State Fuel Administrators for the distribution of the coal allotted to their respective states, subject to general instructions from Washington.

The War Industries Board decides what consumers shall have preference in securing coal; but the United States Fuel Administration assists in the compilation of complete preference lists by obtaining reports and recommendations from the State and Local Fuel Administrators.

All consumers of coal, except domestic consumers, are recorded under the following classifications:

(a) Railroads,
(b) Army & Navy, together with other Departments of the Federal Government.
(c) State and County Departments and Institutions,
(d) Public Utilities,
(e) Retail Dealers,
(f) Manufacturing plants on War Industries Board's Preference List.
(g) Manufacturing plants not on War Industries Board's Preference List.

The first six classes are given preference in shipments. The distribution of coal to consumers in the first two classes and shipments to a few vitally important plants are handled from Washington.

Fuel Administration District Representatives in the producing fields have these preference lists to guide them, as well as weekly reports from each manufacturing plant, and with the State and Local Fuel Administrators give particular attention to building up proper stocks of coal for all war plants.

PRIORITIES OF COAL AND COKE SHIPMENTS

The War Industries Board regarding shipments of coal and coke has listed certain industries for preference, whose operation is of exceptional importance, measured by the extent of their direct and indirect contribution either toward winning the war or toward promoting the national welfare. Not only do the industries coming under the new classification receive preferential treatment by the Fuel Administration but also in transportation by the railroads.

The following is the list of preferred industries as slightly amended in April, 1918:

Aircraft: Plants engaged exclusively in manufacturing aircraft or supplies and equipment therefor.

Ammunition: Plants engaged in the manufacture of ammunition for the United States Government and the Allies.

Army and Navy contonments and camps.

Arms (small): Plants engaged in manufacturing small arms for the United States Government and the Allies.

Chemicals: Plants engaged exclusively in manufacturing chemicals.

Coke plants.

Domestic consumers.

Electrical equipment: Plants manufacturing same.

Electrodes: Plants producing electrodes.

Explosives: Plants manufacturing explosives.

Farm implements: Manufacturers exclusively of agricultural implements and farm operating equipment.

Feed: Plants producing feed.

Ferro-alloys: Plants producing.

Fertilizers: Manufacturers of fertilizers.

Fire brick: Plants producing exclusively.

Food: Plants manufacturing, milling, preparing, refining, preserving, and wholesaling food for human consumption.

Food containers: Manufacturers of tin and glass containers and manufacturers exclusively of other food containers.

Gas: Gas producing plants.

Guns (large): Plants manufacturing same.

Hemp, jute and cotton bags: Plants manufacturing exclusively hemp, jute and cotton bags.

Insecticides: Manufacturers exclusively of insecticides and fungicides.

Iron and steel: Blast furnaces and foundries.

Laundries.

Machine tools: Plants manufacturing machine tools.

Mines.

Mines: Plants engaged exclusively in manufacturing mining tools and equipment.

Newspapers and periodicals: Plants printing and publishing exclusively newspapers and periodicals.

Oil: Refineries of both mineral and vegetable oils.

Oil production: Plants manufacturing exclusively oil well equipment.

Public institutions and buildings.

Public utilities.

Railways.

Railways: Plants manufacturing locomotives, freight cars and rails, and other plants engaged exclusively in manufacture of railway supplies.

Refrigeration: Refrigeration for food and exclusive ice-producing plants.

Seeds: Producers or wholesalers of seeds (except flower seeds).

Ships (bunker coal): Not including pleasure craft.

Ships: Plants engaged exclusively in building ships (not including pleasure craft) or in manufacturing exclusively supplies and equipment therefor.

Soap: Manufacturers of soap.

Steel: Steel plants and rolling mills.

Tanners: Tanning plants, save for patent leather.

Tanning extracts: Plants manufacturing tanning extracts.

Tin plate: Manufacturers of tin plate.

Twine (binder) and rope: Plants producing exclusively binder twine and rope.

Wire rope and rope wire: Manufacturers of same.

Automobile plants are not in the list.

UNITED STATES COAL PRODUCTION, 1915 AND 1916

Given by States in order of rank in number of tons produced in 1916. Also number of mine employees in each State and total average days worked.

(Figures compiled by C. E. Lesher, United States Geological Survey.)

		1915		1916	
State	Rank	Total (Net tons)	Number Employees	Total (Net tons)	Number Employees
Pennsylvania (Bitum.)	1	157,955,137	174,593	170,295,424	168,212
West Virginia	2	77,184,069	75,882	86,460,127	78,067
Illinois	3	58,829,576	75,610	66,195,336	75,538
Ohio	4	22,434,691	40,053	34,728,219	41,394
Kentucky	5	21,361,674	27,960	25,393,997	31,222
Indiana	6	17,006,152	22,777	20,093,528	23,965
Alabama	7	14,927,937	22,591	18,086,197	25,308
Colorado	8	8,624,980	12,372	10,484,237	13,104
Virginia	9	8,122,596	8,959	9,707,474	9,777
Wyoming	10	6,554,028	7,244	7,910,647	7,255
Iowa	11	7,614,143	15,549	7,260,800	14,443
Kansas	12	6,824,474	13,260	6,881,455	12,132
Tennessee	13	5,730,361	8,948	6,137,449	9.211
Missouri	14	3,811,593	9,173	4,742,146	9,654
Maryland	15	4,180,477	5,664	4,460,046	5,633
New Mexico	16	3,817,940	4,205	3,793,011	4,522
Montana	17	2,789,755	3,158	3,632,527	3,781
Oklahoma	18	3,693,580	8,457	3,608,011	7,800
Utah	19	3,108,715	3,564	3,567,428	3,129
Washington	20	2,429,095	4.850	3,038,588	4,797
Arkansas	21	1,652,106	3,751	1,994,915	3,772
Texas	22	2,088,908	5.087	1,987,503	4,481
Michigan	23	1,156,138	2,569	1,180,360	2,535
North Dakota	24	528,078	590	634,912	714
Georgia	25	134,496	368	173,554	411
Others, including Alaska		63,727	222	71,791	245
Pennsylvania Anthracite		88,995,061	176,552	87,578,493	159,869
Total bitum.		442,624,426	557,456	502,519,682	561,102
Grand total		531,619,487	734,008	590,098,175	720,971

Bituminous employes worked an average of 203 days in 1915 and 230 days in 1916, and in 1916 mined 3.89 tons per employe per day.

Anthracite employes worked an average of 230 days in 1915 and 253 days in 1916, and in 1916 mined an average per employe per day of 2.16 tons.

Four Thousand Under License

The license section of the Fuel Administration prepares regulations governing persons licensed by the Fuel Administration; conducts hearings in regard to such regulations, and issues rulings and decisions thereon. Four thousand persons have been placed under license since April 1, 1918.

COAL SOURCES AND UTILIZATION

(From U. S. Smithsonian Institution Bulletin.)

Of the coal mined in the United States about one-seventh is anthracite, while the rest is bituminous coal of various grades. The anthracite comes from a small area of less than 500 square miles in Pennsylvania; the bituminous supply from 30 states, with Pennsylvania, West Virginia, Illinois and Ohio contributing about three-fourths of the total.

Coal as now used fulfills three distinct and unrelated functions. It furnishes industrial power, material for the manufacture of coal products, and domestic heat. About two-thirds of the coal consumed in the United States goes into the production of power, which is divided almost equally between the industries and the transportation systems; about one-sixth is used as a raw material for making substances employed industrially, such as metallurgical coke, upon which the iron industry depends, and gas, nitrogen compounds, benzol, tar and coal-tar products. One-sixth, approximately, is employed for heating homes and other buildings. It will be observed, then, that the combined industrial requirements outweigh the needs of the home five to one.

In round numbers one (1) ton of bituminous coal yields 1,440 pounds of coke, 10,000 cubic feet of gas, 22 pounds of ammonium sulphate, 2½ gallons of crude benzol and 9 gallons of tar. Half the gas is useful as fuel or in lighting; ammonium sulphate is valuable fertilizer; benzol is excellent motor fuel.

Coal-gas is distilled from bituminous coal by heating the latter in retorts. Carbureted water-gas is produced as a result of the action of steam upon coke or anthracite, the non-illuminating water-gas thus produced being then "carbureted," or enriched, by the addition of a gas of high thermal and illuminating power made from oil. Mixed gas is a mixture of coal-gas and carbureted water-gas and is supplied in many cities of the United States, the coke from the coal-gas production furnishing the basis of the water-gas manufacture.

The Bureau of Mines has demonstrated that one ton of air-dried lignite may be made to yield 8,000 to 10,000 cubic feet of gas, 17 pounds of ammonium sulphate, one gallon of oil, 50 pounds of tar and one-half to two-thirds ton of carbon residue, convertible into briquettes approaching the value of anthracite. Thus may even coals lowest in rank be raised to meet the social needs for smokeless fuel and economy.

The following figures show the contrast between the value of one ton of bituminous coal and of products which it contains, based on conditions prevailing in 1915. The contrast is greater today:

		Value at point of production, 1915.	Value at mine, 1915.
One ton (2,000 pounds) bituminous coal		....	$1.13
Contains:	1,500 pounds of smokeless fuel	$5.00	
	10,000 cubic feet gas at 90c per 1,000	9.00	
	22 pounds ammonium sulphate at 2 8c	.61	
	2½ gallons benzol, at 30c	.75	
	9 gallons tar, at 2.6c	.23	
	Total	$15.59	$1.13

Obviously there should be a way for the home to get its fuel more cheaply than it does, when coal worth $1 at the mines contains abotu $14 worth of commodities useful to society.

Next to the soldiers on the firing line, the coal savers are the best patriots in the national service.

FACTORIES NOT TO USE ANTHRACITE

It having been pointed out to the United States Fuel Administration that anthracite coal of domestic sizes was being substituted in certain communities for bituminous in the making of steam, a letter condemning the practice and sounding a warning against it was sent out by the Administration early in April, 1918. A month later the Administration's attitude in this matter was made more positive in a letter defining its policy in which said:

> The Administration is satisfied that one of the causes of our domestic difficulties last winter in New England was due to the fact that with the extreme shortage of bituminous coal prevailing in New England and the northwestern section of this country, dealers were prevailed upon by industries to give them domestic sizes of anthracite in order that they might keep their plants in operation.
>
> Every ton of coal so diverted from its proper and normal channels of consumption meant increased difficulty on the part of domestic consumers in having their requirements taken care of. The Administration does not want any anthracite coal turned over to industrial plants without having the case passed upon and the facts established that the industry must have anthracite coal, and further no dealer shall deliver anthracite to an industrial concern without an exemption from the Federal Fuel Administration.

COAL RESERVES OF THE WORLD

Showing number of tons of the supply in each country; also number of tons of each one of the three grades, and percentages in all cases. (All figures represent billions of 2,000-lb. tons, i.e., 000,000,000's omitted.)

(Compiled from several tables in Report of Twelfth International Congress, held in Toronto, Can., in 1913 (3 vols) "The Coal Resources of the World.")

Countries.	Total Reserves of all Grades		Anthracite, inc. Some Dry Coals		Bituminous Two Grades		Sub-Bituminous and Lignite	
	Billion Tons	Per Cent. of Total	Billion Tons	Per Cent. of Total	Billion Tons	Per Cent. of Total	Billion Tons	Per Cent. of Total
United States. inc. Alaska .	4,231	52.0	22	4.0	2,155	50.1	2,054	62.2
Canada	1,361	16.7	2	.4	313	7.3	1,046	31.6
China	1,097	13.4	427	77.9	670	15.6	...	...
Germany	467	5.7	...	...	452	10.5	15	.5
Great Britain	209	2.6	12	2.3	197	4.6	...	...
Siberia	192	2.3	...	...	73	1.7	119	3.6
Australia	183	2.2	...	...	146	3.4	37	1.1
India	87	1.1	...	...	84	2.0	3	.1
Russia, Europe	66	.8	41	7.6	23	.5	2	.1
Union, S. Africa	62	.8	13	2.4	49	1.1	...	...
Austria	59	.7	...	...	45	1.0	14	.4
Columbia	30	.3	...	...	30	.7	...	...
Indo-China	22	.3	22	4.0	...	...	...	...
France	19	.2	4	.6	14	.3	1	.1
Belgium	12	.2	...	...	12	.3	...	...
Spain	10	.1	2	.3	7	.2	1	...
Spitzbergen	9	.1	...	...	9	.2	...	...
Japan	9	.1	...	...	8	.2	1	...
Holland	5	.1	...	...	5	.1	...	.
Other Countries	24	.3	3	.5	10	.2	11	.3
Total res.	8,154	100.0	548	100.0	4,302	100.0	3,304	100.0

Fuel Administration rules have provided cleaner coal. You make it go further.

ANALYSIS OF COAL PRODUCTION IN UNITED STATES TO END OF 1917

By periods and decades since 1807, and by years since 1908, showing more production in last 12 years than all time before.

Years (Inclusive)	Pennsylvania Anthracite	Bituminous	Total Net Tons	Period Totals
1807 to 1820..........	12,000	3,000	15,000	
1820 to 1825..........	71,141	256,040	327,181	
1826 to 1835..........	3,007,371	1,160,778	4,168,149	
1836 to 1845..........	13,393,484	9,784,153	23,177,637	
1846 to 1855..........	51,948,337	31,469,490	83,417,827	End of 1865: 284,900,808.
1856 to 1865..........	98,593,540	75,201,474	173,795,014	
1866 to 1875..........	198,436,722	220,988,382	419,425,104	1807-1885: 1,552,086,231.
1876 to 1885..........	309,991,788	537,768,531	847,760,319	
1886 to 1895..........	486,784,754	1,099,313,887	1,586,098,641	1807-1905: 5,970,587,618.
1896 to 1905..........	612,395,214	2,220,007,532	2,832,402,746	
1906 to 1915..........	851,878,227	4,066,839,056	4,918,717,283	

Production During Last Ten Years

1908	83,268,754	332,573,944	415,842,698	12 Year Total 1906 to 1917: 6,163,543,458.
1909	81,070,359	379,744,257	460,814,616	
1910	84,485,236	417,111,142	501,596,378	
1911	90,464,067	405,907,059	496,371,126	
1912	84,361,598	450,104,982	534,466,580	
1913	91,524,922	478,435,297	569,960,219	
1914	90,821,507	422,703,970	513,525,477	
1915	88,995,061	442,624,426	531,619,487	
1916	87,578,493	502,519,682	590,098,175	
1917	*100,000,000	*554,728,000	*654,728,000	
Total, decade 1908-1917.	882,569,997	4,386,452,759	5,269,022,756	
Total, 111 yrs., 1807-1917	2,814,091,071	9,320,040,005	12,134,131,076	

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* Production figures for 1917 are estimated.

NOTE: Anthracite production exceeded that of bituminous until after the Civil War. Since that time it has grown less and less, proportionately, from year to year. Ten years ago the proportionate increase of bituminous production had reached a point about four times as great as anthracite, and last year the production of bituminous had become nearly six times as much as that of anthracite. This is illustrative of the tremendous increase of American industries, which absorb nearly all of the bituminous production.

PRICES FROM LAKE DOCKS REDUCED

Material reductions in the prices from June 1, 1918, to April 30, 1919, for bituminous coal consumed in the Northwest were made by the United States Fuel Administration, in an order fixing a schedule for shipments from any Lake Michigan or Superior dock to purchasers buying in carload lots. The prices are based on the freight rates between the mines and Lake Erie ports. At the same time an amendment of the regulation concerning jobber's margins was made. This allows a margin of twenty cents per ton to licensees handling coal from the docks.

There are two firing lines—the one at the front and the one at the furnace door. To waste ammunition in the rear is just as unpatriotic as to waste ammunition at the front. Coal is ammunition. This is a steam war as distinguished from the hand-power wars of other generations. Coal power is national power.

IMPORTANCE OF OIL PRODUCTION

M. L. Requa, director of the oil division of the United States Fuel Administration, delivered an address at the petroleum congress, held in Chicago March, 1918, outlining the duty of the producers in that industry, with reference to the war:

"This war can not be won without petroleum," said he, "and you have each your part to do in providing that commodity. Your responsibility is no less great than the soldiers' in the front-line trench; your failure to discharge your obligation no less treasonable."

The history of oil production since the beginning of the industry in 1859 was reviewed briefly, as follows:

"We have produced from the year 1859 to date a total of more than 4,250,000,000 barrels of oil. Our production has increased by decades from 500,000 in 1860 to 5,260,000 in 1870, 26,286,000 in 1880, 45,823,000 in 1890, 63,620,00 in 1900, 209,557,000 in 1910, and about 330,000,000 in 1917. Over long periods the average increase has been about 7 per cent. of the previous year's production. At this rate of increase we shall require 460,000,000 barrels per annum in 1927, and for 1918, if the average holds good, we shall require an additional amount above last year's production of approximately 23,000,000 barrels."

> "The way to be patriotic in America is not only to love America, but to love the duty that lies nearest to our hand, and know that in performing it we are serving our country."—*President Wilson.*
>
> The saving of coal is one of the most urgent duties near at hand. A duty, in the performance of which every man and woman can join.

FUEL OIL USED BY RAILROADS IN 1917

Increase in railroad traffic due to the participation of the United States in the war increased the quantity of petroleum consumed as locomotive fuel in 1917, despite its mounting cost and growing scarcity.

Statistics compiled under the supervision of J. D. Northrop, of the United States Geological Survey, show that the quantity of fuel oil consumed by oil-burning locomotives in 1917 was 45,707,082 barrels, a gain of 3,580,665 barrels, or 8.5 per cent. over 1916 and a larger consumption than in any other year.

The total distance covered by oil-burning engines in 1917 was 146,997,144 miles, and the average distance covered per barrel of fuel consumed was 3.2 miles. Oil-burning locomotives were operated in 1917 over 32,431 miles of track in 21 States.

OIL PRODUCED IN 1917 EAST OF THE MISSISSIPPI

Although production of the older petroleum fields of the United States has recently been declining at an average rate of about 5 per cent. a year, preliminary statistics compiled under the direction of J. D. Northrop by the United States Geological Survey, show 44,347,780 barrels of petroleum marketed from the Appalachian, Lima-Indiana, and Illinois oil fields in 1917. This was less than 1 per cent. below the output of these fields in 1916. The value of this oil at the wells was $115,887,864, which was $23,844,249, or 26 per cent. more than the value of the output from these fields in 1916.

Throughout the area covered by this report, which is subject to revision, the year 1917 was one of unremitting effort on the part of the petroleum operators to stimulate production, although they were hampered by mounting costs and increasing scarcity of drilling supplies and of labor.

In all 9,116 wells were drilled for oil in the fields east of the Mississippi in 1917, a loss of 1,091 wells, or 10 per cent., compared with 1916. Of the wells completed 6,042, or 66 per cent. were oil wells, credited with an average output of 16 barrels each the first 24 hours after completion, 1,246 were gas wells, and 1,828, an average of one in every five completed, were failures.

REMEMBER, COAL IS NOW OUR MOST PRECIOUS MINERAL. IT IS THE HUB OF THE WAR WHEEL. THE SUPPLY IS SHORT.
"SAVE THAT EXTRA SHOVELFUL."

VALUE OF NATURAL GAS PRODUCED

In the twelve leading States in this production by periodical years from 1890 to 1916. In order of present rank. Figures from U. S. Geological Survey.

	1916	1915	1910	1905	1900	1890
West Va. ..	$47,603,396	$36,424,263	$23,816,553	$10,075,804	$2,959,032	$5,400
Penna.	24,344,324	21,139,605	21,057,211	19,197,336	10,215,412	9,551,025
Ohio	15,601,144	17,391,060	8,626,954	5,721,462	2,178,234	4,684,300
Okla.	11,983,774	9,195,804	3,490,704	130,137	......	......
California ..	5,440,277	4,069,004	476,697	133,696	79,083	33,000
Kansas	4,855,389	4,037,011	7,755,367	2,261,836	356,900	12,000
Texas	3,143,871	2,593,873	*956,683	*15,909	*20,000	......
Louisiana ..	2,660,445	2,163,934	......	......	......	......
New York...	2,524,115	2,335,252	1,678,720	623,251	335,367	552,000
Kentucky ..	752,635	614,998	456,293	237,290	†286,243	†30,000
Indiana ...	503,373	695,380	1,473,403	3,094,134	7,254,539	2,302,500
Illinois	396,357	350,371	613,642	7,233	1,700	6,000

* Iucludes Alabama and Louisiana.

† Includes Tennessee.

NOTE: Pennsylvania produced $19,282,375 in 1888. Its production decreased gradually until 1896, and then increased again.

The army cantonments must be heated. The munition factories must be maintained at full steam, The battleships must be coaled. Help save coal for them.

PRODUCTION AND CONSUMPTION OF OIL REFINERY PRODUCTS IN UNITED STATES FOR 1917 COMPARED WITH 1916

Prepared from records of Bureau of Mines and United States Custom House.
(Stated in Barrels of 42 Gallons.)

U. S. Consumed:	Gasoline and Naphthas	Kerosene and Illuminating	Gas Oil and Fuel Oil	Total Consumption
1916	40,547,861	14,304,935	88,245,068	143,097,864
1917	52,172,811	22,034,101	126,475,942	200,682,854
Increase	11,624,950	7,729,166	38,230,874	57,584,990
Per Cent.	28.6%	54.0%	43.3%	40.2%
Exported:				
1916	8,473,102	20,349,724	22,800,053	51,622,879
1917	10,788,147	15,613,010	26,645,287	53,046,444
Difference	2,315,045	4,736,714	3,845,234	1,423,565
Per Cent.	(Inc.) 27.3%	(Dec.) 23.3%	(Inc.) 16.9%	(Inc.) 2.8%
Total Outgo:				
1916	49,020,963	34,654,659	111,045,121	194,720,743
1917	*62,960,958	†37,647,111	‡153,121,229	§253,729,298
Increase	13,939,995	2,992,452	42,076,108	59,008,555

* Production was 64,993,643 barrels, which leaves 2,032,685 barrels in stock.

† Production was 38,143,208 barrels, which leaves 496,097 barrels in stock.

‡ Includes 3,396,692 barrels used from stock, as 1917 production was 149,724.537 barrels.

§ Production was 867.910 barrels less.

NOTE: Crude run to stills increased 21.9% in 1917 over 1916.

Per Cent.	28.4%	8.6%	37.9%	30.3%

CRUDE PETROLEUM MOVEMENT IN MAY, 1918

The movement of crude petroleum from the fields east of the Rocky Mountains during May, 1918, was 2.3 per cent. more than in April, 1918, and 2.0 per cent. more than in May, 1917. In the same fields the net depletion of stocks since May 31, 1917, was about 16,000,000 barrels.

The apparent consumption of crude oil in May was 11.2 per cent. greater than in April, 1918, and 1.5 per cent. less than in May, 1917.

The following summary of the movement of crude petroleum in May, 1918, represents the operation of 208 pipe line and refining companies that handle or receive oil directly from the productive fields east of the Rocky Mountains and is compiled under the supervision of J. D. Northrop from reports received by the United States Geological Survey, prior to noon of June 29, 1918. Figures represent barrels of 42 gallons each.

Field.	Number of companies reporting.	Moved from field sources.	Delivered to refineries or others.	Stocks at end of May, 1918.
Appalachian	46	2,132,609	2,103,080	3,955,244
Lima-Indiana	11	314,930	312,648	1,621,664
Illinois	7	1,209,979	1,213,017	3,063,580
Oklahoma-Kansas	99	12,063,064	11,948,364	92,013,220
Central and North Texas...........	17	1,033,414	1,009,689	3,415,065
North Louisiana	8	1,354,749	733,000	3,215,700
Gulf Coast	11	1,917,234	1,843,375	8,767,512
Rocky Mountain	9	1,084,060	969,248	865,127

NOTE: Statistics of petroleum movement in California are not included in this tabulation because of delays incident to procuring first-hand data.

PERSONNEL OF FUEL ADMINISTRATION

United States Fuel Administrator, Harry A. Garfield.

(Summary of article in *Daily Financial America.*)

Lawyer in Cleveland, from 1888 to 1904; during 1901 and 1902 managed syndicate which successfully developed large mines in Piney Fork district of Ohio and connected those operations by railroad with a Lake Erie port; built the Garfield Building, one of the largest in Cleveland; was active in organization of Cleveland Trust Company, one of the strongest financial institutions there; aided in successful reorgaization and refinancing of Conneaut Water Company; had charge of large estate with extensive real estate, iron mine, shipbuilding and other interests; President of Cleveland Chamber of Commerce in 1898, also conducted construction of its present building; from 1897 to 1908, Chairman of National Committee which reorganized United States Consular Service; was instrumental in organizing and for years the guiding spirit in Cleveland Citizens' Association, which freed the city from control of the so-called McKisson ring; in 1903 retired from law practice and accepted chair of Politics at Princeton University; in 1908 was unanimously elected President of Williams College, of which both he and his father were graduates, and was appointed Fuel Administrator August 23, 1917. He has two sons in the army.

Assistant United States Fuel Administrator, Cyrus Garnsey, Jr., formerly controller of the Kansas City, Fort Scott and Memphis Railroad, later executive head of the Calloway Coal Company, of Memphis, and one of the proprietors of the Patterson Transfer Company, of Memphis, the largest warehousing company in the South. On January 1, 1917, he sold his interest in the coal business and retired from active management of the Transfer Company. He has a son commissioned in the American Army in France.

Legal Advisor, B. W. Warren, of Warren, Garfield, Whiteside & Lamson, attorneys, of Boston, Mass.

Labor Advisor, John P. White, formerly president United Mine Workers of America.

Bituminous Advisor, Rembrandt Peale, president of Peale, Peacock & Kerr, bituminous operators; one of the most prominent men in the bituminous industry.

Technical Advisor, S. A. Taylor, formerly dean of the mining school of the University of Pittsburgh; also a consulting mining engineer of Pittsburgh.

Anthracite Advisor, James B. Neale, coal operator in the anthracite and soft coal fields of PePnnsylvania; of the firm of Thorne, Neale & Co., and familiar with both anthracite and bituminous production.

Transportation Adviser, G. N. Snider, Coal Traffic Manager, New York Central Lines, East; assistant to Rembrandt Peale in organization and operation of Tidewater Coal Exchange for bituminous coal shippers and eastern railroads moving coal to tidewater.

Engineers to Fuel Administration, R. V. Norris, recently vice-president American Institute of Mining Engineers; member Institute of Mining Engineers of Great Britain. James H. Allport, consulting engineer, member American Institute of Mining Engineers.

Executive Secretary to the Fuel Administrator, David Whitcomb, of Seattle, formerly Federal Administrator for the State of Washington.

ADMINISTRATIVE DIVISION

Director, Cyrus Garnsey, Jr. (also Assistant Administrator, see above).

Legal Bureau.

General Solicitor, W. T. Alden, of the legal firm of Alden, Latham & Young, of Chicago. The pressure of Mr. Alden's business forces him to limit his service to a temporary arrangement.

Solicitor in charge of License and Enforcement Sections, W. B. Symmes, Jr., attorney of New York City, who handles jobbers' permits and clean coal preparation licenses.

(*Continued on Page* 59)

(*Fuel Administration Personnel, continued*)

Bureau of Production.

Director, James B. Neale (also Anthracite Advisor, see Page 58).

Bureau of Labor.

John P. White (also Labor Advisor, see Page 58).
Rembrandt Peale (also Bituminous Advisor, see Page 58).

Bureau of Prices.

Director, E. Q. Trowbridge, until recently senior member of banking house of Trowbridge & Co., New York and New Haven.

Bureau of State Organizations.

Director, Walter E. Hope, member of the law firm of Masten & Nichols, of New York. (Temporarily absent in New York.)

Acting Director, Evans Woollen, president Fletcher Savings & Trust Co., Indianapolis, and also Federal Fuel Administrator for Indiana.

Bureau of Conservation.

Director, P. B. Noyes; ex-president of the American Hardware Association; president of Oneida Community, Ltd.

Assistant, G. N. Allen, vice-president of Oneida Community, Ltd.

Assistant, C. F. Austin, formerly with Winchester Arms Co., New Haven; afterwards with Oneida Community, Ltd.

Advisory Engineer, Fuel Engineering Section, David Moffat Myers; of Griggs & Myers, consulting engineers, New York; author of books on steam-power plant engineering.

Chief Electrical Engineering Section, Charles E. Stuart, of Stuart, James & Cooke, specialists in power and equipment for mines and port terminal facilities for coal handling.

Chief, Industrial Furnace Section, A. F. Greaves-Walker, local manager American Refractories Co., Baltimore, president Canadian National Clay Products Co.

Bureau of Traffic and Transportation.

Manager Inland Traffic attached to Fuel Administration, representing Director-General of Railways, F. M. Whitaker, vice-president in charge of traffic of Chesapeake and Ohio Railroad, Hocking Valley Railway, Chesapeake & Ohio of Indiana and Chesapeake & Ohio Northern.

G. N. Snider (also Transportation Advisor, see Page 58).

Bureau of Investigation.

Director, R. H. Vorfeld; engaged in Federal Trade Commission's anthracite and bituminous coal investigation; Captain Quartermaster Reserve Corps.

Bureau of Education.

Director, E. R. Sartwell, an experienced newspaper man, and for some years connected with the United Press Association, International News Service and Associated Press.

Conservation, T. M. Alexander, New York.

Business Office.

Manager, R. S. Neely, assistant manager of the Ford Motor Co., Long Island City; has had twenty years' experience in office and sales management.

DISTRIBUTION DIVISION

General Director, J. D. A. Morrow, formerly assistant secretary of the Federal Trade Commission; commissioner of the Pittsburgh Coal Producers' Association; later general secretary of the National Coal Association, composed of the representative bituminous coal operators of the country.

(*Continued on page* 60)

(Fuel Administration Personnel, continued)

Bureau of Bituminous Coal.

Director, A. W. Calloway, president of the Davis Coal & Coke Company; also the Pittsburgh Terminal Railroad & Coal Co., with long experience in production and distribution of coal. He has one son with the army in France.

Assistant Director, S. L. Yerkes, of the Grider Coal Sales Agency, of Alabama, and for twelve years with the Queen & Crescent Railroad.

Manager Lake and Canadian Distribution, C. P. White, formerly at Duluth. Minn., and Superior, Wis., in charge of Lake Superior coal dock properties for twenty years, and recently general manager of the Clarkson Coal Mining Co.

Manager, Railroad Fuel Distribution, W. A. Marsh; General Manager of Sales of the Pittsburgh Coal Co., Pittsburgh, Pa.

Manager, Tidewater Distribution, H. A. Cochran; Traffic Manager Davis Coal & Coke Co., formerly General Coal Freight Agent, Baltimore & Ohio Railroad.

Manager, Coal Zone Permits, C. B. Nichols; formerly general sales agent of Westmoreland Coal Co., Philadelphia.

Manager of Bituminous Inspection, Charles M. Means, one of the best known mining engineers in the country.

Manager, Statistical Section, C. E. Lesher; in charge of coal and coke statistics for United States Geological Survey, and author of the reports on coal and coke published by the Geological Survey.

Bureau of Anthracite.

Director, A. S. Learoyd, associated with anthracite industry for years and General Freight Agent of the Lackawanna Railroad since 1911.

Bureau of Coke.

Director, W. S. Blauvelt, of the Solvay Process Company, of Detroit, Mich., and the Semet-Solvay Co., of that city, in the handling of coal and producing of by-products in the manufacture of coke.

Bureau of Gas Plants.

Director, James T. Lynn, of Detroit, Mich., for a number of years president of the National Commercial Gas Association.

Bureau of State Distribution.

Director, A. M. Ogle; president of Vandalia Coal Co., and connected with Indiana Coke & Gas Co., both of Terre Haute, Ind.

OIL DIVISION

Director, Mark L. Requa, formerly manager of Nevada Consolidated Copper Co.; chairman of Valuation Committee of the Independent Oil Producers' Agency of California; built Nevada Northern Railroad from Cobra to Ely, Nevada.

Counsel, Norman B. Beecher, of the firm of Burlingham, Montgomery & Beecher, New York City, attorneys for a large number of steamship companies.

Chief of Oil Conservation, W. Champlin Robinson, head of the William C. Robinson & Sons Co. and the Robinson Oil Corporation, Baltimore.

Director of Lubricants and Foreign Purchases, A. C. Woodman, vice-president and treasurer of the Union Petroleum Co., Philadelphia.

Bureau Oil Well Supplies.

Director, George E. Day, formerly president Youngstown (Ohio) Pipe & Sheet Co., oil well supplies.

Bureau of Oil Production.

Director, Thomas A. O'Donnell, Los Angeles, Cal.; president and general manager American Petroleum Co., California Production Co.

Bureau of Pipe Lines.

Director, S. A. Guiberson, Jr., Los Angeles, California; formerly in charge of the Associated Pipe Line.

(Continued on Page 61)

(Fuel Administration Personnel, continued)

Bureau of Technology.

Director, William A. Williams, Bartelsville, Oklahoma, vice-president Empire Co., oil subsidiaries of Henry A. Dougherty & Co., New York.

Bureau of Traffic and Transportation.

Director and Manager of Inland Traffic, John A. Middleton, Kansas City, Mo.; formerly general freight agent Frisco Line.

Bureau of Domestic Consumptioh.

Director, Clifford G. Sheffield, Los Angeles, California; Union Oil Co., of California.

Bureau of Prices and Licenses.

Director, Aubrey G. MacGuire, Milwaukee, president The Bartles' MacGuire Oil Co., and other companies.

Bureau of Statistics.

Director, Frank J. Silsbee, Los Angeles, Cal.; editor Pacific Petroleum Record.

Bureau of Costs.

Director, Thomas Cox, of Cox & Juessen, San Francisco, Cal.

THE IMPORTANT POINT FOR EVERYONE TO REMEMBER IS THAT IF COAL IS CONSUMED IN THE OLD "PEACE-TIME" WAY THE SUPPLY WILL FALL SHORT OF NECESSARY REQUIREMENTS IN SPITE OF THE LARGE INCREASE IN PRODUCTION. THE FUEL ADMINISTRATION IS DETERMINED THAT SUFFICIENT COAL FOR THE WAR, FOR PUBLIC UTILITIES, AND FOR DOMESTIC CONSUMERS SHALL BE PROVIDED.

License Revoked and Refund Required

The Fuel Administration on July 17, 1918, revoked Distributor's License X-02284, held by John W. Moore, of Columbus, Ohio, effective July 31st. The Elk Coal Company, of which Mr. Moore is the president, was ordered to refund to the extent of several thousand dollars, commissions charged and collected by it upon transactions carried on under the license issued by the Fuel Administration to Mr. Moore.

The Elk Company was carrying on business under the license issued to the president of the company personally, Mr. Moore's only plea in mitigation of his offense was alleged ignorance of regulations.

Fuel Administration Coke Representatives

Connellsville Region.—Charles E. Lenhart, Uniontown, Pa., R. M. Fry, Uniontown, Pa., John M. Jamison, Greensburg, Pa.

Ohio, Southern Michigan and Kentucky Bank of Ohio River.—J. A. Ballard, Detroit, Mich.

Indiana, Illinois, Wisconsin, Minnesota and Missouri.—James A. Galligan, 332 South Michigan Ave., Chicago, Ill.

Anthracite Committee

W. J. Richards, S. D. Warriner, Joseph B. Dickson, 437 Chestnut Street, Philadelphia, Pa.

FEDERAL FUEL ADMINISTRATORS

UNITED STATES FUEL ADMINISTRATION

Alabama	S. P. Kennedy		Anniston
*Arizona	Charles M. Shannon		Flagstaff
Arkansas	H. C. Couch		Little Rock
California	Albert E. Schwabacher	First Natl. Bank Bldg	San Francisco
California (Oil)	D. M. Folsom	Amer. Natl. Bank Bldg	San Francisco
Colorado	William J. Galligan	State Museum Bldg	Denver
Connecticut	Thomas W. Russell	State Capitol	Hartford
Delaware	Charles H. Ten Weeges	145 Dupont Bldg	Wilmington
*Dist. of Columbia	Frank G. Jones (Director)	U. S. Fuel Adm'n	Washington
Florida	Arthur T. Williams	7 West Forsyth Street	Jacksonville
Georgia	Dr. L. G. Hardman		Commerce
Idaho	Frank R. Gooding		Gooding
Illinois	Raymond E. Durham	120 West Adams Street	Chicago
Indiana	Evans Woollen	227 Federal Bldg	Indianapolis
Iowa	Charles Webster	State House	Des Moines
Kansas	Emerson Carey		Hutchinson
Kentucky	Wiley B. Bryan	Inter-Southern Bldg.	Louisville
Louisiana	John G. O'Kelley	Canal Bank Annex	New Orleans
Maine	J. C. Hamlen	Masonic Bldg.	Portland
Maryland	Ferdinand A. Meyer	16 Commerce Street	Baltimore
Massachusetts	James J. Storrow	State House	Boston
Michigan	William K. Prudden	State House	Lansing
Minnesota	John F. McGee	New York Life Bldg	Minneapolis
Mississippi	C. L. Townes		Minter City
Missouri	Wallace Crossley	State Capitol	Jefferson City
*Montana	Martin H. Gerry, Jr		Helena
Nebraska	John L. Kennedy	Saunders-Kennedy Bldg.	Omaha
Nevada	E. H. Walker	State Capitol	Carson City
New England	James J. Storrow	State House	Boston
New Hampshire	Charles M. Floyd	829 Elm Street	Manchester
New Jersey	Richard C. Jenkinson	Natl. State Bank Bldg	Newark
*New Mexico	John W. Poe		Roswell
*New York	D. W. Cooke	61 Broadway	New York City
*North Carolina	R. C. Norfleet		Winston-Salem
North Dakota	I. P. Baker		Bismarck
Ohio	Joseph H. Frantz		Columbus
Oklahoma	P. A. Norris		Ada
Oregon	Fred J. Holmes	Northwestern Bank Bldg	Portland
Pennsylvania	William Potter	Medical Arts Bldg	Philadelphia
Rhode Island	Malcolm G. Chase		Providence
South Carolina	B. B. Gossett		Anderson
South Dakota	W. G. Bickelhaupt		Aberdeen
Tennessee	W. E. Meyer	State Capitol	Nashville
Texas	Wiley Blair	Pacific and Hawkins Streets	Dallas
Utah	W. W. Armstrong	Box No. 1788	Salt Lake City
Vermont	H. J. M. Jones		Montpelier
Virginia	Harry F. Byrd		Richmond
*Washington	Winlock W. Miller		Seattle
West Virginia	J. Walter Barnes		Fairmont
Wisconsin	W. N. Fitzgerald	1st Natl. Bank Bldg	Milwaukee
Wyoming	Augustine Kendall	P. O. Box 942	Rock Springs
Cuba	Albert G. Smith	Care Ward Line	New York City

* Indicates there was another State Administrator, succeeded by the present incumbent. Former administrators were: Arizona, Will L. Clark; District of Columbia, John L. Weaver; Montana, W. J. Swindlehurst; New Mexico, W. C. McDonald; New York, A. H. Wiggin; North Carolina, A. W. McAlister; Ohio, Homer H. Johnson; Rhode Island, George H. Holmes; Washington, David Whitcomb.

DISTRICT REPRESENTATIVES AND THEIR DISTRICTS

UNITED STATES FUEL ADMINISTRATION

No.	Name	Address	Fields
1.	J. P. Cameron	Altoona, Pa.	Central Pennsylvania.
1A.	John Lloyd, Jr.,	Altoona, Pa.	Main Line Pa. R. R.
1B.	Henry B. Scott,	Phillipsburg, Pa.	Clearfield Region
1C.	Samuel A. Rinn,	Punxsutawney, Pa.	B. R. & P.; B. & S.; and P. S. & N.
2.	F. B. Reimann	301 Butler County Nat'l Bank Bldg., Butler, Pa.	Western Pennsylvania, north of Pittsburgh
3.	R. W. Gardiner	Farmers Bank Bldg., Pittsburgh, Pa.	Pittsburgh and Panhandle District
3A.	J. B. Huff	Greensburg, Pa.	Westmoreland-Irwin Gas Legonier, Latrobe, Greensburg.
3B.	W. L. Byers	Uniontown, Pa.	Connellsville Region
4.	John C. Brydon	Cumberland, Md.	Somerset-Meyersdale, Pa. Cumberland - Piedmont, Up. Potom., Md., W. Va.
	J. Howard Magee,	Cumberland, Md.	Asst. for entire district
	J. M. Cover, Asst.	Somerset, Pa.	Somerset-Meyersdale.
5.	D. R. Lawson	Fairmont, W. Va.	Fairmount-Clarksburg.
6.	D. F. Hurd	Marion Building, Cleveland, Ohio.	Eastern & Central Ohio.
6B.	Arthur N. Fancher	Bay City, Mich.	Michigan.
7.	W. D. McKinney	44 East Broad Street, Columbus, Ohio.	Southern Ohio.
8A.	C. M. Roehrig	Ashland, Ky.	Big Sandy and Elkhorn.
8B.	R. A. Hord	Lexington, Ky.	Hazard.
9.	A. H. Land	Huntington, W. Va.	High Volatile Fields of Southern W. Va. Fields
10A.	W. R. J. Zimmerman	Charleston, W. Va.	New River and Winding Gulf
10B.	E. J. Howe	Law & Commerce Bldg., Bluefield, W. Va.	Tug River and Pocahontas Fields, W. Va., and Virginia Anthracite Field
11.	G. D. Kilgore	Norton, Va.	Clinch Valley and Southwestern Virginia.
12.	E. R. Clayton	1017 Holston Nat'l Bk. Bldg., Knoxville, Tenn.	Harlan Field in Ky. and Tenn., and Ga.
13.	E. A. Holmes	Birmingham, Ala.	Alabama.
14.	C. E. Reed	Louisville, Ky.	Western Kentucky.
15.	C. G. Hall	Terre Haute, Ind.	Indiana.
16.	F. C. Honnold	Fischer Bldg., Chicago.	Illinois.
17.	H. N. Taylor	Keith & Perry Bldg., Kansas City, Mo.	Iowa, Missouri, Kansas, Arkansas, Okla., Texas.
18.	W. H. Groverman	1015 Plymouth Bldg., Minneapolis, Minn.	Lake Superior and Lake Michigan Docks.
19.	W. B. Innes	Billings, Mont.	Mont. and No. Wyoming
20.	Moroni Heiner	Salt Lake City, Utah.	Utah and So. Wyoming.
21.	George D. Kimball	Denver, Colorado.	Colorado.
22.	J. Van Houten	Albuquerque,	New Mexico.
23.	D. C. Botting	Seattle, Wash.	Washington.

COAL PRODUCED BY IMPORTANT COAL-MINING COUNTRIES

	Net Tons 1913	Net Tons 1914	Net Tons 1915	Net Tons 1916	Net Tons 1917
United States....	569,690,219	513,525,477	531,619,487	590,098,175	*654,728,000
Great Britain...	321,922,130	297,698,617	283,560,980	287,118,153	*278,289,893
Germany	305,714,664	*270,594,952	*258,590,094	....	....
Austria-Hungary..	60,575,201	*53,396,400	*52,679,712	*55,482,000	....
France..........	45,108,544	32,765,156	*21,899,781	*24,040,000	*30,800,000
Russia	35,500,674	36,414,560	31,158,400	33,550,000	....
Belgium	25,196,869	*19,000,000	*15,691,465	....	....
Japan	23,988,292	21,700,572	22,539,822	25,237,541	....
India	18,163,856	18,439,975	18,673,984	18,389,372	....
China	15,432,200	*10,199,200	*19,800,000	....	....
Canada	15,115,089	13,637,529	13,267,023	14,483,395	....
New South Wales	11,663,865	11,644,476	....	9,102,420	....
Spain	4,731,647	4,877,141	5,155,428	6,055,727	....
Union of S. Africa	....	9,461,674	9,275,083	11,208,402	....
New Zealand ...	2,115,834	2,548,664	2,473,659	*2,941,500	....
Holland	2,064,608	2,121,394	2,488,363	....	....
Chile	1,362,334	....	....	....	....
Queensland	1,162,497	1,180,825	1,137,186	....	....
Italy	772,802	859,516	1,045,256	....	....
Victoria	668,524	691,644	....	468,270	....
Dutch East Indies	453,136	626,351	485,158	539,816	....
Orange Free State	609,973	699,217	727,557	....	....
Indo-China	....	608,660	708,800	*855,555	....
Peru	301,970	317,923	323,680	....	....
Sweden	401,199	404,146	457,184	....	....
W. Australia	351,687	357,526	321,065	....	....

* Estimated.

NOTE: Approximate total for the world is 1,346,000,000 net tons, of which the United States in 1917 produced nearly one-half.

CLASSIFICATIONS OF COAL

The Geological Survey gives to coal six classifications. They are: Anthracite, semi-anthracite, semi-bituminous, bituminous, sub-bituminous, and lignite. All of these various classes are produced in the United States.

Most of the anthracite coal is mined in eastern Pennsylvania. Small areas of coal exist in the West that are placed in the anthracite classification, but which are not identical in quality with the Pennsylvania anthracite. Anthracite is an almost ideal domestic fuel, but is not well adapted to steam raising, although it is used for this purpose when an absolutely smokeless fuel is required.

There is very little semi-anthracite in this country, hence is but a small factor in the trade.

Semi-bituminous is of higher rank than bituminous. It has a high percentage of fixed carbon, which makes it nearly smokeless. It is best adapted to raising steam and to general manufacture that requires a high degree of heat. It is regarded as the best coal for steamships, and is used almost exclusively by the Navy. Being of a soft, tender quality, it is easily broken. This fineness is regarded by those accustomed to lump coal as detrimental, but it is not. It burns slowly and retains a high degree of heat.

Bituminous coal is produced in a number of grades, but generally speaking it describes a rank of coal having about equal proportions of volatile matter and fixed carbon. Bituminous coal is only slightly affected chemically by weathering unless it is exposed for many years.

"Sub-bituminous" is a term adopted by the Geological Survey to describe a rank of coal more generally known as "black lignite." It is produced principally in the Western States. It is a clean, domestic coal, and ignites easily.

Lignite is a product of North Dakota and Texas. It is heavy in moisture when it comes from the mines, but dries quickly when exposed to the weather. Lignite is marketed mainly at points near the mine as a domestic fuel.

PLAY FAIR WITH UNCLE SAM

"They have learned how to use coal economically in Europe—through having to pay all the way from twenty to ninety dollars a ton for it. The man who is paying that does not need any fuel administration to urge him, on patriotic grounds, to stop wasting coal. He develops the keenest interest in that subject without prompting; and he saves the coal.

"If our Government took its hand off the fuel situation to-day there would be no wasting of coal next winter. The price would go to such a height that every man who burned a ton of coal would make it his personal business to see it was burned to the best advantage.

"The Government will not take its hand off. It wants poor people to have a chance at fuel too. It gives the people the benefit of a not exorbitant price. They ought to show their appreciation by using the coal just as carefully as though they were paying the European price."—*Saturday Evening Post,* July 20, 1918.

MSH 21472

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TITLE